The IRON AGE

January 30, 1958 A Chilton Publication The National Metalworking Weekly

Special Survey Report:

What's Wrong With Executive Rating Programs? P. 63

Tool Builders Fight To Reverse Downtrend – P. 49

Report New Process For Reducing Iron Ores – P. 93

Digest of the Week P. 2-3

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The IRON AGE

January 30, 1958—Vol. 181, No. 5

Digest of the Week in

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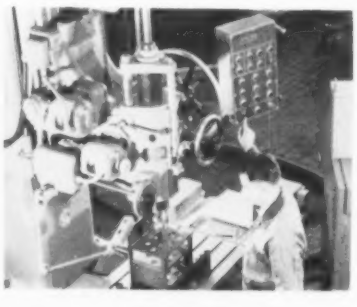
NEWS ARTICLES

TOOL BUILDERS

Out to Beat Downtrend — Machine tool builders aren't crying the blues over sagging sales. They're



improving products, seeking new markets, and making other moves to improve their positions. P. 49

AUTOWORKERS

1958 Demands — Only limited opposition is raised at UAW convention to new profit-sharing demands. Aircraft workers will ask severance pay. Layoffs place new emphasis on SUB. P. 52

SCRAP STABILITY

Will Industry Achieve It?—That was one of the big questions occupying iron and steel scrap men at their 30th annual convention. Retiring president outlines five-point program as answer to the problem. P. 53

IKE AND LABOR

Moderate Approach—Ike's proposals for labor legislation lack punch. It's the moderate approach

Metalworking

HOW DO YOU RATE? The executives shown on the cover (for names see p. 63) are discussing an executive rating program—a management tool that can be as important as technological advance. Their company is one of four hundred surveyed. P. 63

calling for clean unions. Congress' reception is also moderate. P. 77

REDS IN JET MARKET?

Their Salesmen Are Active — Chalk up another area where the Reds want to compete: The commercial jet air-liner market. With a subsidized industry they could pare our prices in half. And they're already flying a plane bigger than any on U. S. drawing boards. P. 79

FEATURE ARTICLES

DIRECT ORE REDUCTION

With Carbon Monoxide—Here's a process that goes a step beyond direct reduction to end up with a highly useful iron carbide. Called the Stelling process, it diffuses enough carbon into the iron to produce cementite. The cementite in turn adapts to continuous tonnage production of steel. P. 93

KEY TO NEW ALLOYS

High-Pressure Metallurgy — It's quite possible that high-pressure metallurgy will pick up where vacuum metallurgy leaves off. Researchers at National Bureau of Standards have come up with a technique for working test materials: They plan to conduct their experiments in a 7½-carat diamond at pressures up to 450,000 psi. P. 96

RELIEVE WELD LAYERS

To Insure Quality Repair — By alternately welding and stress relieving, cycle arc welding repaired a 5-ton crankshaft. It led to significant savings in downtime and in expense of investing in a new casting. P. 98

PLASTIC TOOLING

Fibers Extend Life—Plastic tools for metal forming can handle longer press runs than ever before. The secret lies in reinforcement with metal and glass fibers. The reinforced tools are edging into medium production run areas. P. 100

HIGH TEMP MATERIALS

What's Needed Today—Aircraft and missiles call for new materials and new ways to fabricate them. This second part of a two-part feature pinpoints our need for better high temperature materials and forming techniques. P. 102

MARKETS & PRICES

STEEL FORGINGS

No Market Slump—Makers of large steel forgings aren't worrying about a business falloff. Orders from hydroelectric plants continue strong. And prospects for atomic reactor orders are promising. P. 54

AIR SUSPENSION

Competes With Springs—Automakers are turning to air suspension systems because they allow more space for passengers. Alarmed springmakers are developing new systems to stave off air's gains. P. 72

MACHINE TOOL SALES

The Slump Continues — After being in the $28-$29 million-per-month range for three months, new tool orders dropped in December to $18.7 million. It was the worst month since Oct., 1949. P. 81

STEEL INVENTORIES

Cutbacks Slowing Down — A growing minority of companies plan to buy more steel in the second quarter than in the current period. Buyers are still cautious. P. 129

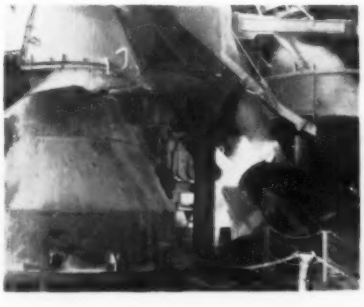
INDUSTRIAL TRUCKS

Sales Are Slow — Buying of industrial trucks is down about 18 pct below '57 levels. As a result, the customer is getting lots of special attention from dealers and manufacturers. P. 130

NEXT WEEK

OXYGEN STEEL

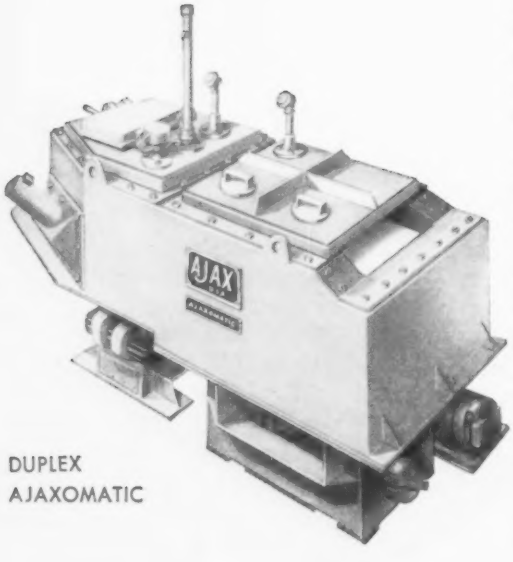
Passes Million Mark — Annual capacity of oxygen steel is now over 1 million tons. Next week's Special Report documents the progress and future possibilities of oxygen steelmaking in U. S. plants. The process is gaining support.



CAN WE STILL AFFORD HAND-LADLING?

AJAXOMATICS

bring automation to die casting



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AJAXOMATIC

The Duplex AJAXOMATIC melts aluminum pig and gates right at the die casting machine. By pushing a button the operator initiates the complete casting cycle: the die closes and the Duplex AJAXOMATIC pours the exact required amount of molten metal directly into the cold chamber. The operator just removes the finished casting at the end of the cycle.

Automation, however, is only part of the AJAXOMATIC story. The Duplex AJAXOMATIC also gives assurance of consistent quality. The quality of a finished casting begins with the proper melting of the metal. 60 cycle induction with its two basic features of internal heating and electromagnetic stirring is used exclusively in the Duplex AJAXOMATIC. Here are the unique characteristics of the Duplex AJAXOMATIC:

Precision temperature control — at low temperature	No supply ladle system or hand ladles
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No gas porosity	Comfortable working conditions
Low metal loss	Low maintenance

The standard Duplex AJAXOMATIC is rated 120 kw to produce 500 lbs per hour of castings ranging from ½ lb to 30 lbs. Other AJAXOMATICS are available to suit a wide range of production requirements, including units supplied from central melting systems. May we have an opportunity to study your requirements?

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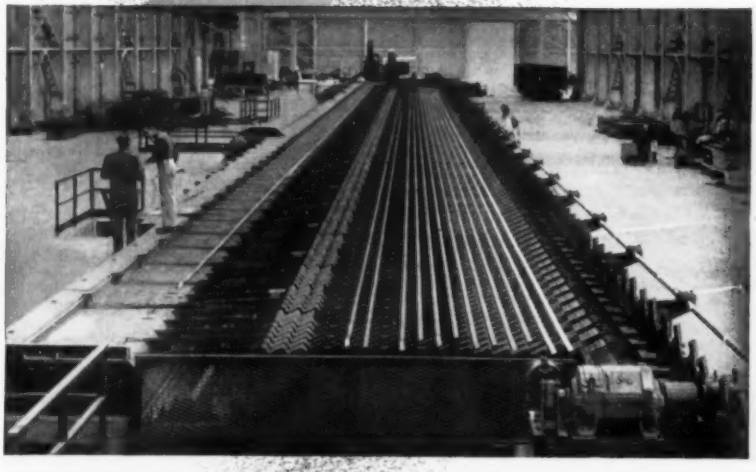

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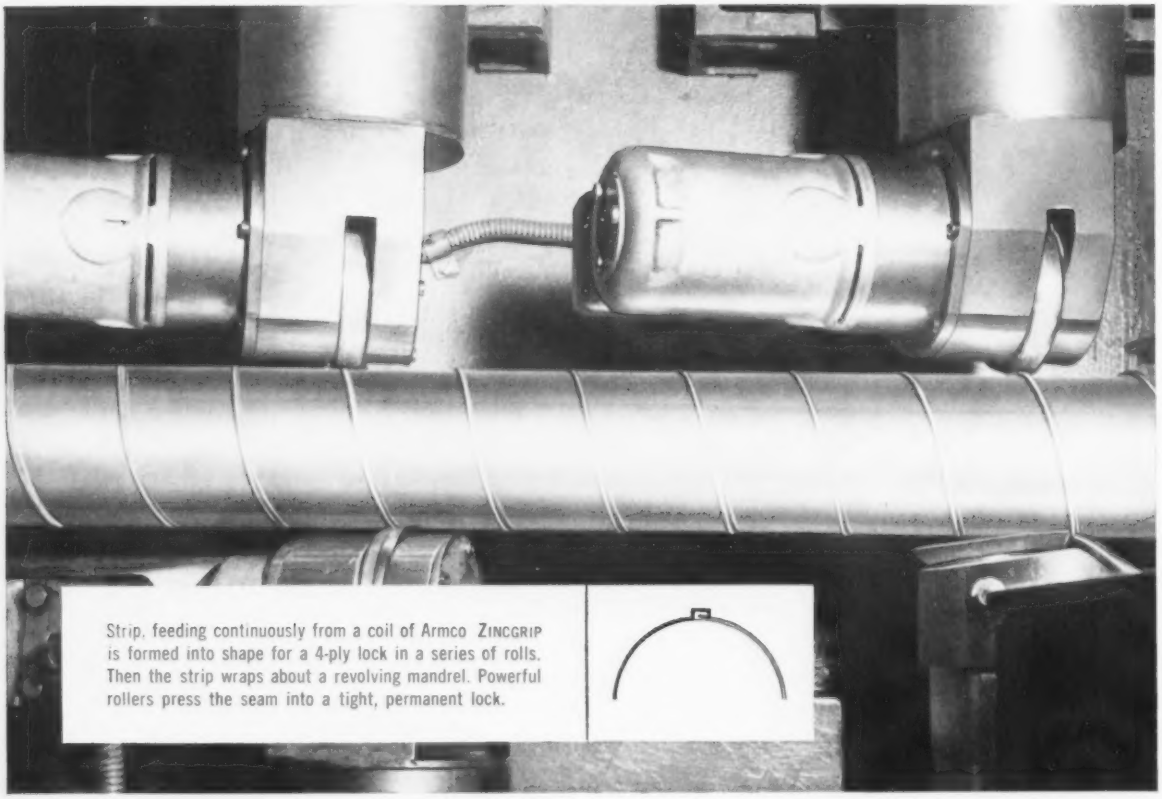
RM 72

in this continuous lockseaming operation . . .

Zinc coating on Armco ZINCGRIP Steel doesn't flake or peel



Strip, feeding continuously from a coil of Armco ZINCGRIP is formed into shape for a 4-ply lock in a series of rolls. Then the strip wraps about a revolving mandrel. Powerful rollers press the seam into a tight, permanent lock.

Here's in-shop evidence that the zinc coating on Armco ZINCGRIP® Steel clings tightly during severe fabrication.

This machine forms sheet metal into conduit with a continuous spiral lockseam. Few fabricating operations could provide so severe a test for a zinc-coated steel. But Armco ZINCGRIP Steel meets every requirement. Its special hot-dip zinc coating doesn't flake or peel.

This complete zinc protection is doubly important for the conduit. It not only wards off rust when exposed on construction sites, but resists corrosion in areas within buildings where maintenance is difficult or impossible.

If your products require drawing, forming, lockseaming, or any other severe fabrication, you can rely on Armco ZINCGRIP. Just fill in and mail the coupon for full information about this workable, zinc-protected steel.

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Labor Relations Outlook: It's a Little Bit Stormy Now

Walter Reuther is telling car makers how to run their business. That's his prerogative, but there is no sense in taking seriously his attempt to tell them how to distribute profits.

This is still a free country. How much a company makes is up to that company, to the tax collector and to the competition. To most of us, profit is not yet a dirty word.

If a car manufacturer makes too much profit, one or two things happen: The competition cuts prices to get a bigger slice of the market; or the customers don't buy. Auto firms don't need Mr. Reuther to alert them to these possibilities.

Walter wants his latest blast to: Get him more publicity; use as a dollar trader; befog the main issues; and finally to cover up his dropping of the 32-hour week demand.

This makes the collective bargaining future a pretty rough affair. Unions must do something to prove their worth. Union heads have to "get something" in the face of layoffs, shorter time and prospects for more of the same. If they don't, out they go.

Management has its troubles too. It is getting tired of having to raise prices to pay for wage increases and fringes which run far ahead of productivity gains. For that reason it must make up its mind this year just how courageously it will meet these new demands. This is the year to stand up and be counted.

There is danger too that too much soft pedaling of wage hassles—or strike probabilities—will give the public the idea that it is the goat, the middle person between companies and unions. That isn't true, but if there is no real stand against excessive demands you can't blame a lot of people for thinking they are the suckers.

Getting back to Mr. Reuther. Suppose the auto heads said to Walter, "We propose that you rebate some of the union dues to the worker. Further, we propose that you use 25 pct of the union 'take' above a certain figure as a supplemental pension to help the worker." Mr. Reuther's suggestion about profits is just as gratuitous, even though he has the right to express his opinion.

There is labor trouble ahead. We must meet it with hard-headed thinking, not with wishful and timid overtures.

Tom Campbell

Editor-in-Chief

(Advertisement)

Chemical Prepaint Treatments for Metal Surfaces

What they do, the types available, how they are applied

By J. H. GEYER
Manager, Product Development Dept.,
AMERICAN CHEMICAL PAINT COMPANY

Paint systems have been steadily improved in an effort to produce more decorative, easier-to-apply, and more corrosion-resistant films. The ability, however, of any paint film to perform its predetermined functions cannot be fully utilized without properly preparing the metal surface.

The prepaint preparation of the metal surface is therefore a highly important part of the system. Chemical prepaint treatments are designed to do four jobs and do them well. First, they remove organic soils, shop dirt, scale, and rust or corrosion products from the metal surface. Second, they provide surfaces that are completely compatible with subsequent paint films. Third, they produce a *tooth* that promotes good paint film adhesion. Fourth, they effectively prevent underpaint corrosion growth after any breakthrough in the paint film.

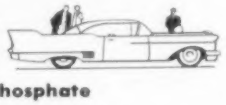
Basically, there are four types of chemical prepaint treatments. These are phosphoric acid, iron phosphate, zinc phosphate, and amorphous phosphate or chromate. Each is discussed briefly in the following paragraphs.

Phosphoric Acid

Perhaps the most widely used and certainly one of the most economical chemical prepaint treatments is the phosphoric acid cleaner combination materials. ACP Deoxidine® is such a material. It removes organic soils, rust, scale and contaminating elements from the metal surface. It also produces a light etch on steel, aluminum or zinc surfaces which considerably aids in increasing paint adhesion. It does not, however, form an actual coating on the metal surface. Any breakthrough in the subsequent paint film will permit underfilm corrosion to proceed. Grades of Deoxidine are available for application by brush or swab, hot and cold dip, or hot spray.

Iron Phosphate

Iron phosphating processes are extensively used in the chemical prepaint treatment of appliances such as water heater shells, ranges, washers, dryers and other *white lines*. These processes will produce excellent paint-bonding films on the metal and retard or prevent underpaint corrosion. Duridine,® ACP's iron phosphating process, is a combination organic soil cleaner and iron phosphate coating material. Both the cleaning and coating operations take place in the same bath. Duridine and other iron phosphates do not lend themselves to brush-on application, are primarily designed for spray type equipment of four or five stages. But several dip installations are successfully operating today by inclusion of an alkali precleaning stage.



Zinc Phosphate

ACP Granodine® is an example of this type of chemical prepaint treatment process, the type now being used to treat steel in the automotive industry, and predominantly specified for steel ordnance and military items. This process forms a coating which offers the ultimate in paint adhesion promotion and vastly augments the corrosion resistance of subsequent paint films. Zinc phosphate materials are extremely flexible as to method of application—can be applied by brush, dip or automatic spray equipment. In a typical dip or power spray system, the stages would be alkali clean, water rinse, zinc phosphate treatment, water rinse, and acidulated final rinse. If the metal has considerable areas of rust or scale, an acid pickle is advisable following the alkali cleaning stage.

On zinc surfaces, the zinc phosphates perform a rather unique function. They act as a barrier against chemical reaction between the applied paint film and the zinc surface. This effectively prevents blistering of the paint and early breakdown of the film. This is in addition, of course, to the improvement of paint adhesion and the retarding of underpaint corrosion. ACP Lithoform® is specially designed for use over zinc surfaces and finds wide application as a prepaint treatment for ornamental zinc die castings, refrigerator liners, and on most galvanized work requiring painted finishes.

Amorphous Phosphate and Chromate

These coatings are the films produced by the ACP Alodine processes and similar ones on aluminum surfaces. They have met with wide acceptance in the prepaint treatment of venetian blind strips, refrigerator liners, aluminum heat transfer units, aircraft sheet metal assemblies, and many other items fabricated from aluminum. The various coatings provide an excellent film for the promotion of paint adhesion and effectively prevent underfilm corrosion. As in the case of zinc, aluminum exhibits a tendency to chemically react with some paint systems. The Alodine processes develop a barrier film between the paint and the aluminum surfaces which prevents this reaction. The Alodines are extremely versatile materials that can be applied to aluminum surfaces by brush, hand spray, dipping, mechanical spraying, or roller coating equipment. Brush application is particularly well adapted to the processing of parts too large for simple dip systems or in manufacturing operations that do not warrant a tank setup. In dip, spray or roller coating application, the system usually consists of an alkaline preclean, a water rinse, the Alodine treatment, a water rinse, and an acidulated final rinse. Where the surface is heavily oxidized, a deoxidizer in the line is needed.

The major chemical prepaint treatments for metals have been covered briefly in this article. More complete information can be had by contacting an ACP sales representative or by writing us at Ambler, Pa.

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New Year Report

Sir—Although I have been a reader of your editorials for a number of years and have always found them very helpful, this is my first "letter to the editor"—although I know I should have said "thank you" a number of times.

As usual your editorial in the Jan. 2 issue "Every New Year Is Tough, Don't Let This One Throw You" is unusually good and just what a lot of us need.—J. M. Lindsley, National-Standard Co., Niles, Mich.

Strong Spirit

Sir—I have been reading with interest your editorials for some time, and would like to congratulate you especially on two which appeared recently: "Keep Your Head Screwed On" and "Every New Year Is Difficult."

It seems to me you are sensing the spirit of the times, writing forcefully about pertinent problems, and expressing a healthy point of view which is at one and the same time idealistic and realistic.

Best wishes to you for continued editorial effectiveness in the New Year.—K. W. Conners, Mgr., Adv. and Public Relations, Leeds & Northrup Co., Phila.

Cost Control

Sir—Your survey report article, "How To Plan For Lower Costs," in the Dec. 12 issue of your magazine is one of the best published on the subject in recent years.

Most articles on this topic do not set forth as succinctly, if at all, the interrelationships of organization, pricing, costing, etc. to the overall problem of cost control and reduction.

Here's hoping you continue to publish worthwhile articles of this nature.—F. A. Koening, Industrial Engineering Dept., Marquardt Aircraft Co., Van Nuys, Calif.

Leaded Steels

Sir—We have read the article, "How Good Are Leaded Steels in Fatigue?", published in The IRON AGE Jan. 9, 1958 issue. It is well written with a lot of needed information. You are to be congratulated on the timeliness of this information.—G. A. Deming, Mgr., Arch and Wall Div., Chicago Fire Brick Co., Chicago.

Brazilian Ores

Sir—Your Dec. 12 issue (P. 85) refers to a survey of the potential for Brazilian itabirite iron ore deposits, being conducted by the Armour Research Foundation.

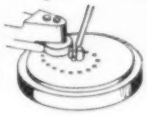
We appreciate your kind interest in bringing this information to the attention of your readers. However, it mistakenly credits us with having completed the study, when we are now only in the preliminary stages. —N. Federgreen, Project Coordinator, Armour Research Foundation, Chicago.

▪ The item said "This is the conclusion of a survey . . ." It should have said "This is the conclusion based on results from preliminary studies."—Ed.

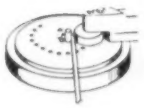
"See what I mean. Everything you ask him to do, he does backwards."

HOW TO BEND
BARS and TUBING

HOW TO BEND . . .
OFF CENTER EYES



1. Insert bar stock between Locking Pin and Radius Pin of desired size.



2. Set Forming Roller against material and advance Operating Arm.

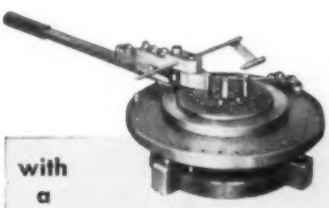
3. Complete operation with one steady movement.

HOW TO BEND . . .
TUBING

1. Clamp tube. Insert Follow Block between material and Forming Roller.

2. Advance Operating Arm until it strikes Angle Stop.

3. Remove Follow Block, release clamp and remove tube.



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Consult the yellow pages of your phone book for the name of your nearest Di-Acro distributor or write:

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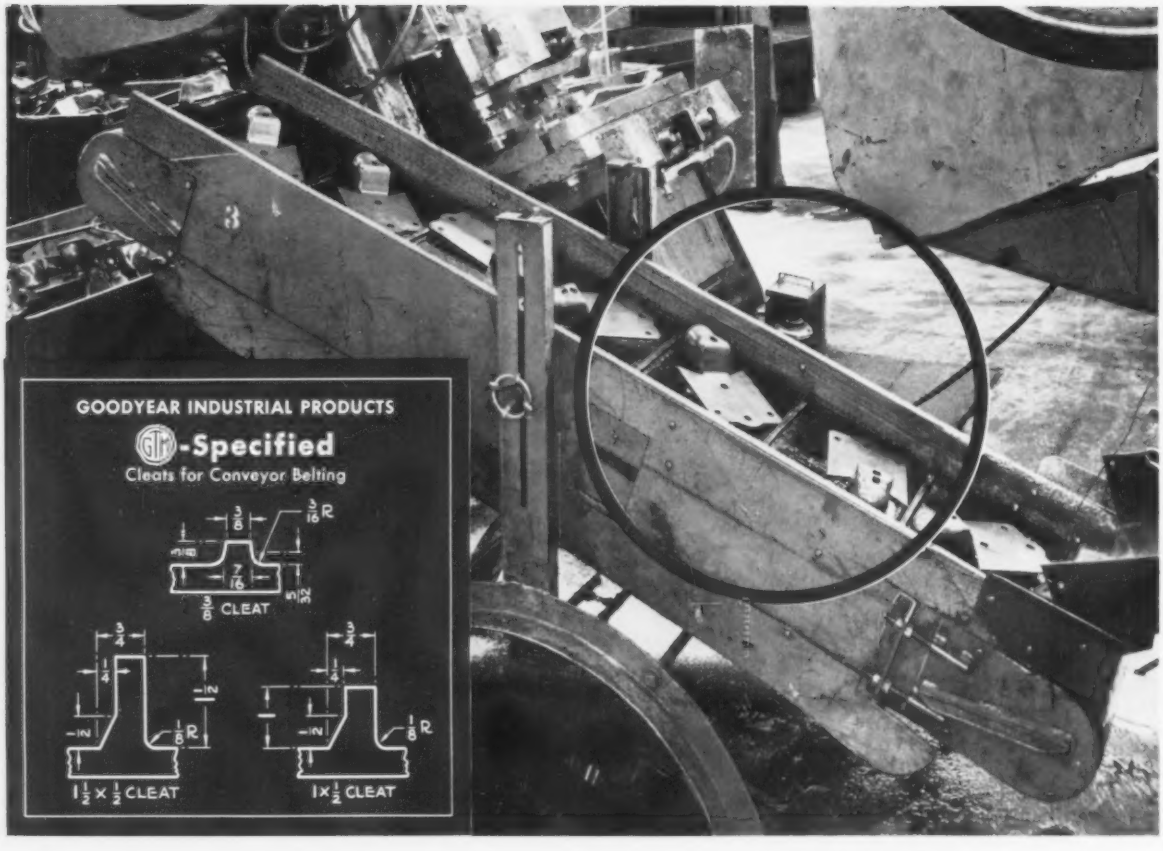
O'NEIL-IRWIN MFG. CO.
302 8th Ave., Lake City, Minn.

di-acro
PRECISION METALWORKING MACHINES



They're raising production—and lowering costs by ⅓

Portable conveyors—between production lines on different levels—were a "must" at this Midwestern automotive parts plant. But the specially constructed belts they used soon cut and flaked off. They became oil-soaked and accumulated dust—dirtying the parts. Worse still, they stretched—had to be taken up every 6 weeks. Even then, none lasted more than a year.

Then the G.T.M.—Goodyear Technical Man—recommended Style ORS Cleated Belts. They're made of rubber especially compounded for extreme resistance to oil, cutting and abrasion. And the tough, firm-gripping cleats are molded right into the rubber for durability.

The savings are impressive: The G.T.M.'s less-expensive belts eliminated the need for parts washing. And after 3 straight years of full service—*three times the life of competitive belts*—they're still going strong.

Like to have savings like these on your production lines? The fastest way to find out is to call the G.T.M. He'll be Johnny-on-the-spot if you contact your Goodyear Distributor—or write Goodyear, Industrial Products Division, Akron 16, Ohio.

• • •

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

CONVEYOR BELTING BY

GOODYEAR

60 YEARS GOODYEAR ANNIVERSARY

THE GREATEST NAME IN RUBBER

FATIGUE CRACKS

What's The Score?

Everybody makes mistakes. But when they are made too often by company executives a firm is headed for trouble. To try to boost the management team's batting average many firms try to strengthen the lineup by installing an executive rating program.

All too often, this fundamentally good idea gets bogged down in a maze of techniques, lacks a sound objective or is just misunderstood.

Survey Report — This week's special survey report, "How To Rate Executives," throws some light on this important problem. For a realistic, down-to-earth analysis of rating programs, what they can and can't do we suggest you turn to p. 63.

Jokelifters, Cont'd

Here is our latest pitiful attempt to inject some humor into this column. We figure if they get bad enough you'll start sending in your own. We're off!

Texas Humor — Just before Christmas a mother brought her son to a Santa Claus in a Dallas department store. The little Texan took one look at Mr. Claus and said, "Santa, what do you need?"
Or . . .

A Texas oilman went to the dentist. After a brief once-over the dentist said, "It looks like you don't have any cavities."

"Drill anyway," the oilman replied, "I feel lucky today."
Or . . .

Two Texans were in a Cadillac showroom. They both liked a white convertible job and one said, "I'll take two, one for each of us."

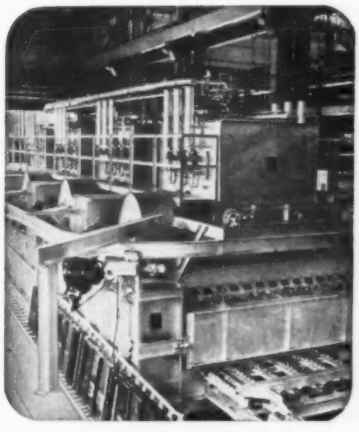
"No, it's my turn," said the other "You got the lunch."

Puzzlers

—and some more winners of the auto puzzler (12-19) who believe in infinity: R. H. Darrell, Bell Aircraft Corp., Buffalo; the GSCC gang; George W. Orton, Major, USAF and Charlie Simmons, Air Force Special Weapons Center, N. M.; and E. A. Chimner, Flint.

WEST COAST REPORT: Tom Campbell, The IRON AGE's editor-in-chief, thinks there is no substitute for traveling to keep a close check on the nation's metalworking pulse. Here he is (left) checking over Seattle's five-year industrial development plan with the city's mayor Gordon Clinton (center) and William S. Leckenby, president of the Leckenby Structural Steel Co. In addition to visiting many metalworking plants in the area, Campbell addressed the Seattle Chamber of Commerce and the Pacific Northwest Steel Fabricators' Assn.

HEAT TREATS ALUMINUM ALLOYS UNIFORMITY ±2°F.



R-S FURNACES AT WYMAN-GORDON KEEP QUALITY UP ...COSTS DOWN

Where aluminum alloy forgings for 18,000 . . . 35,000 . . . and 50,000 ton presses must be heat treated to absolute uniformity R-S Furnaces were entrusted with the job. Six R-S Furnaces at Wyman-Gordon Products Corporation handle all types and sizes of forgings with extreme flexibility and maintain a uniformity of plus or minus 2° F. to 1100° F. Work is pushed thru furnace in steel trays in two rows on roller rails. Every piece emerging has absolute uniformity regardless of size, shape or weight.

For higher quality in heating and forging write for the illustrated folder giving full technical details to...

R-S FURNACE CO., INC.
Philadelphia 44, Pa.

IHEA

Car Hearth Furnaces
Continuous Furnaces
Rotary Type Furnaces

R-S FURNACES

WELDMENT SERVICE

Subcontract this part of your production profitably ...confidently

Now you can employ the nationally known facilities, experience and craftsmanship of The Morgan Engineering Company to produce components for *your* products. Whether you require quantities of small precision weldments or parts weighing up to 80 tons, you can subcontract this part of your production profitably . . . confidently.

Facilities include a complete line of positioning and automatic welding equipment . . . a 20 x 18 x 52 foot stress-relieving furnace . . . modern shot blast equipment and a wide range of machine shop facilities.

Inspection of the Morgan plant is welcomed. Write, wire or phone for complete data on facilities . . . or ask a Morgan sales engineer to call.

THE MORGAN ENGINEERING CO. *Alliance, Ohio*

Overhead electric traveling cranes, gantry cranes, open hearth special cranes, plate mills, blooming mills, structural mills, shears, saws and auxiliary equipment.

EXHIBITS, MEETINGS

Packaging Machinery and Materials Show—March 25-28, Convention Hall, Atlantic City, N. J. (Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22.)

FEBRUARY

The Society of the Plastics Industry, Inc.—Reinforced Plastics Div. —Annual technical and management conference and exhibit, Feb. 4-6, Edgewater Beach Hotel, Chicago. Society headquarters, 250 Park Ave., New York 17.

Malleable Founders Society—Technical and operating conference, Feb. 6-7, Wade Park Manor, Cleveland. Society headquarters, 1800 Union Commerce Bldg., Cleveland.

American Society for Quality Control—Annual conference on management by exception, Feb. 7-8, Carter Hotel, Cleveland, Information: B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland.

Non-Ferrous Founders' Society—West Coast management & operating conference, Feb. 7-8, Ambassador Hotel, Los Angeles. Society headquarters, 1604 Chicago Ave., Evanston, Ill.

Institute of Surplus Dealers—Annual trade show and convention, Feb. 14-17, New York Trade Show Bldg., New York. Society headquarters, 673 Broadway, New York 12.

American Institute of Mining, Metallurgical & Petroleum Engineers—Annual meeting, Feb. 16-20, Hotels Statler and Sheraton-McAlpin, New York. Society headquarters, 29 W. 39th St., New York.

Assn. of Iron & Steel Engineers—Western meeting, Feb. 24-26, Hotel Statler, Los Angeles. Society headquarters, 1010 Empire Bldg., Pittsburgh.

(Continued on P. 16)

NEW FROM KIDDE!

ALL-NEW DRY CHEMICAL EXTINGUISHER KILLS FIRE FASTER, EASIER!

Kidde's new pressurized dry chemical portables awarded top U.L. rating! This means you can attack flammable liquid or electrical fires with confidence. Automatic unlocking device and trigger control mean easier, faster operation. Just follow simple directions . . . REMOVE HORN, PULL TRIGGER – instantly dry chemical knocks out fires. Other new features include extra-large aluminum handle – use with gloves on. Center-balanced–easier to carry. The plastic-faced pressure gauge is recessed for protection, tells at a glance if unit is ready to use. Available in both 20 and 30 lb. capacities.

Kidde

Walter Kidde & Company, Inc., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd., Montreal—Toronto

FREE INFORMATION

WALTER KIDDE & COMPANY, INC.
150 MAIN STREET, BELLEVILLE 9, N. J.

Check appropriate box, tear out, mail this coupon for prices, literature!

☐ Please send me your new P-40 fire extinguishing and detecting equipment catalog.

☐ Please send me prices and specifications for your new dry chemical extinguisher.

P-40 Catalog

NAME_____

ADDRESS_____

CITY_____ STATE_____

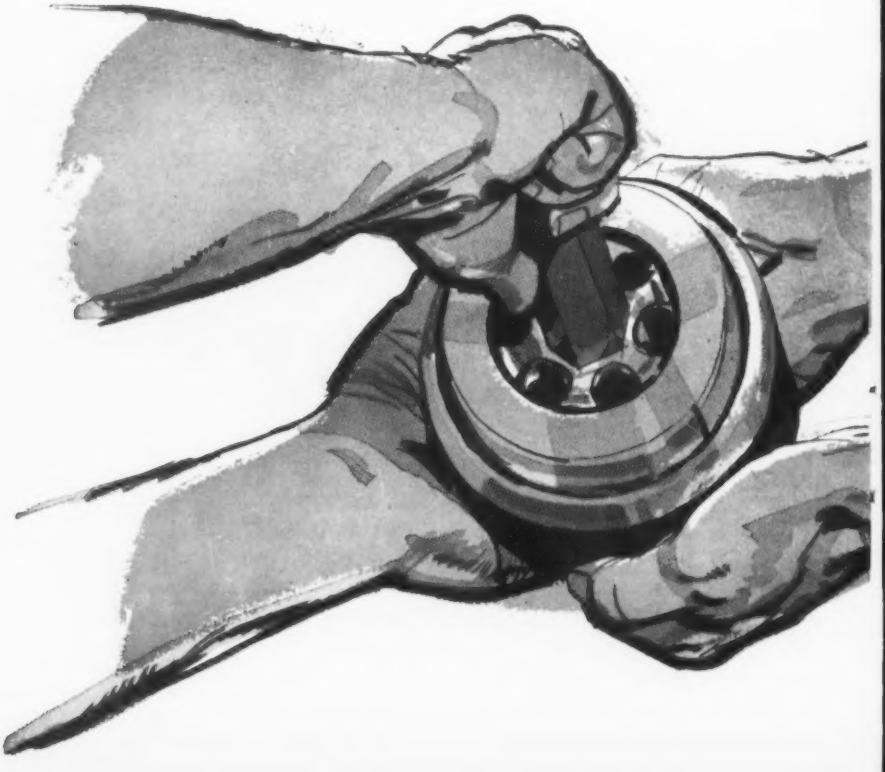
Look what

production increases

this company got with

STANICOOL
HD Soluble Oil

PRODUCTION MANUFACTURING COMPANY DOUBLED NUMBER OF THREADS CUT BETWEEN CUTTER SHARPENINGS, SCORED OTHER PRODUCTION GAINS

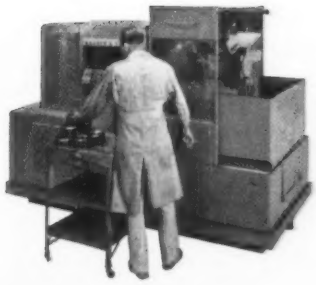


Situation: O. C. Patterson, vice president of Production Manufacturing Company, Tulsa, wanted to cut down on the number of metalworking products used in the plant. He wanted to use just one oil for cutting SAE 1025 steel, screw stock and SAE 440 stainless steel.

Action taken: Checking with Standard Oil lubrication specialist, R. J. MacMurray, Mr. Patterson learned about STANICOOL HD Soluble Oil. A test was set up on a Warner & Swasey automatic bar machine. Roger MacMurray helped set up equipment for the test and helped work out the right STANICOOL HD and water mixtures for the types of metal used. A 4:1 mix for 1025 steel, and up to 10:1 for other metals and jobs was decided upon.

What happened: Parts were threaded on the bar machine that Production Manufacturing had previously been unable to thread. On a new Warner & Swasey AC chucker, it was found STANICOOL made possible threading at a speed of 35 surface feet per minute. With STANICOOL HD 150 threads could be cut before the cutter needs to be sharpened. Only 75 threads could be cut before. Plant management found STANICOOL also protected work from rust while it went through many additional shop operations.

To find out more: All the facts about STANICOOL HD Soluble Oil are yours. Just call your nearby Standard Oil lubrication specialist in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Illinois.**



No trouble. Pressure coupling is checked by O. C. Patterson, vice president of Production Manufacturing, Standard Oil's Roger MacMurray and foreman Byron Finley. Roger MacMurray helped the men in this plant find a new route to production increases with STANICOOL HD Soluble Oil. That's his job, and he's well equipped for it. Eight years' experience in such work, an engineering degree from the University of Colorado and completion of the Standard Oil Sales Engineering School are his qualifications.

Quick facts about

STANICOOL HD Soluble Oil

- Has E. P. and oiliness properties comparable to cutting oil.
- Contains germicide that controls bacteria build-up.
- Is nonirritating to skin.
- Protects machines, tools and work against rust and gumming.
- Will not gel in cold weather, has excellent emulsion stability.

You expect more from STANDARD and get it!

On the right track to a quality melt at lower cost?

Even the bravest learn how to hot-foot it away under pressure...disguising the trail enroute. But while Junior and Chief Keokuk are tethered to the tootsie tracks, old brother bear tiptoes away with the Princess!

POOR QUALITY LEAVES A COSTLY TRACK that can't be covered. Be on the right path from the start . . . always use Keokuk Silvery Pig Iron, the superior form of silicon introduction that distributes evenly in every melt! Handle by magnet, furnace-charge by weight, or count the pigs for equal accuracy. Aluminum producers, there's no substitute for Keokuk Silicon metal.

Keokuk Electro-Metals Company, Keokuk, Iowa;
Wenatchee Division, Wenatchee, Washington.

KEOKUK SILVERY PIG IRON
SILICON METAL – OTHER FERROALLOYS

When you think of SILICON, think of KEOKUK!

SALES AGENT: MILLER AND COMPANY
332 S. Michigan Avenue, Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

Keokuk Silvery Pig—the superior form of silicon introduction—is available in 60 and 30 lb. pigs and 12½ lb. piglets in standard analysis or alloyed to your specifications. Silicon metal and ferrosilicon are supplied in standard sizes and analyses.

EXHIBITS, MEETINGS

(Continued from P. 13)

MARCH

Can Manufacturers Institute, Inc.—Annual meeting, Mar. 3, Waldorf-Astoria Hotel, New York. Society headquarters, 1413 K St., N. W., Washington.

American Machine Tool Distributors' Assn.—Spring meeting, March 10-11, The Roosevelt, New Orleans, La. Society headquarters, 1900 Arch St., Philadelphia 3.

National Assn. of Waste Material Dealers, Inc.—Annual convention, Mar. 15-18, Waldorf-Astoria, New York City. Society headquarters, 271 Madison Ave., New York.

Steel Founders' Society of America—Annual meeting, Mar. 17-18, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland 13.

National Assn. of Corrosion Engineers—Annual conference and exhibition, Mar. 17-21, Civic Auditorium, San Francisco. Society headquarters, 1061 M&M Bldg., Houston.

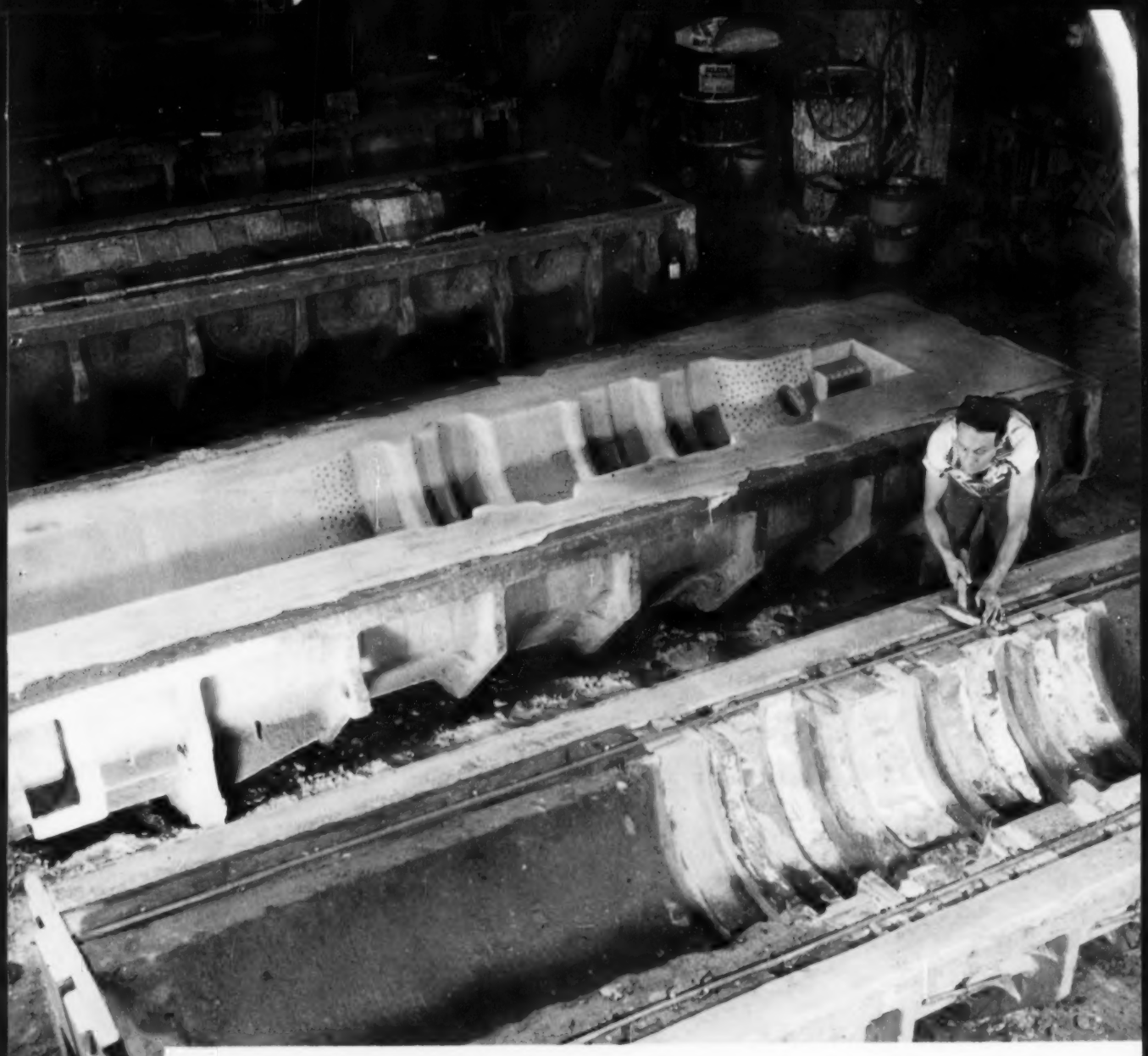
International Acetylene Assn.—Annual spring convention, Mar. 19-21, The Bellevue-Stratford Hotel, Philadelphia. Society headquarters, 205 E. 42nd St., New York.

American Hot Dip Galvanizers Assn., Inc.—Annual meeting, Mar. 27-28, Penn Sheraton Hotel, Pittsburgh. Society headquarters, 1806 First National Bank Bldg., Pittsburgh.

APRIL

Concrete Reinforcing Steel Institute—Annual meeting, Apr. 6-12, The Boca Raton Hotel, Boca Raton, Fla. Society headquarters, 39 S. Dearborn St., Chicago.

Wire Reinforcement Institute, Inc.—Annual spring meeting, Apr. 7-8, Hotel Boca Raton, Boca Raton, Fla. Society headquarters, National Press Bldg., Washington.



Man with a chill

With light taps of his hammer, one of Mack-Hemp's skilled foundrymen coaxes a cast iron chill into place in the sand of a mold for a large steel mill roll. His concern for its exact position stems both from personal pride of workmanship and from the long tradition of painstaking precision which he is helping to maintain . . . a tradition that extends back over 150 years.

This combination of individual skill backed by long experience is the secret of Mackintosh-Hemphill quality; it's the prime reason why *you get more tonnage from the rolls with the striped red wabblers.*

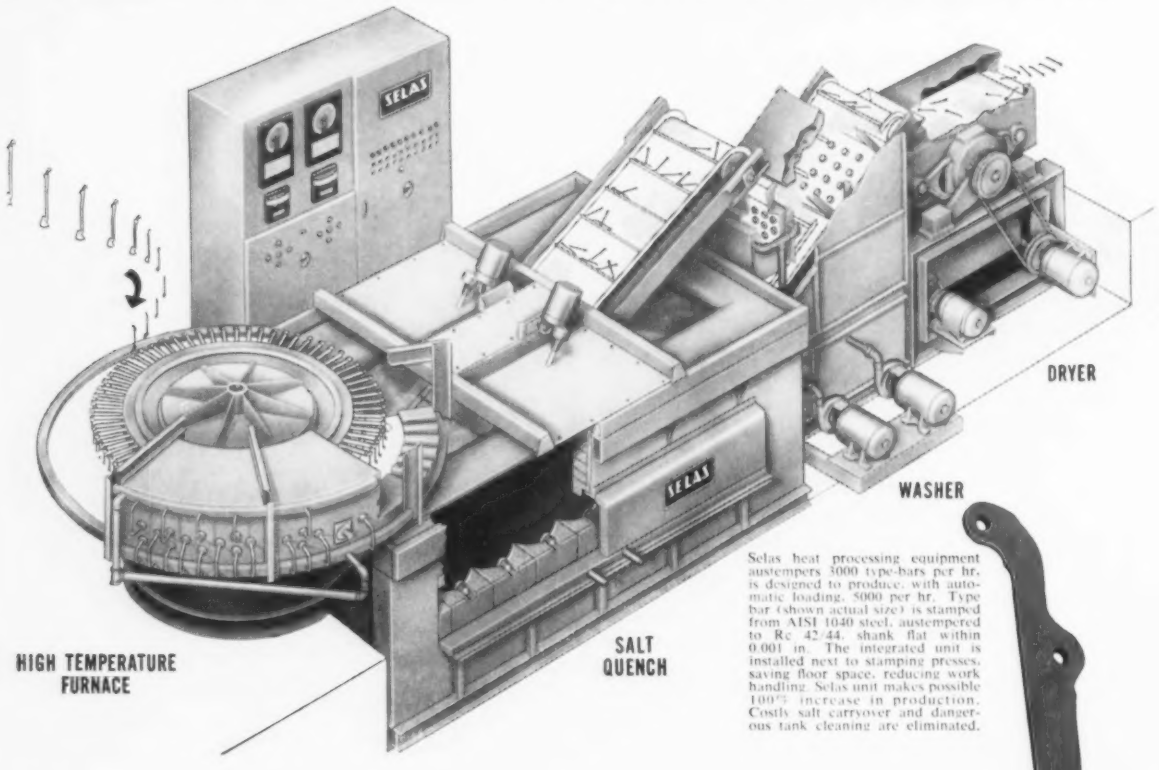
MACKINTOSH-HEMPHILL
Division of E. W. BLISS Company
Pittsburgh and Midland, Pa.

MACKINTOSH-HEMPHILL DIVISION · PITTSBURGH · U.S.A.

BLISS

our research is your reward

Selas custom-builds heat processing equipment to fit into your production line



Selas heat processing equipment austempers 5000 type-bars per hr. is designed to produce, with automatic loading, 5000 per hr. Type bar (shown actual size) is stamped from AISI 1040 steel, austempered to Rc 42/44, shank flat within 0.001 in. The integrated unit is installed next to stamping presses, saving floor space, reducing work handling. Selas unit makes possible 100% increase in production. Costly salt carryover and dangerous tank cleaning are eliminated.

Example: automatic austempering increases IBM type bar production 100%

For more than a year, this Selas custom-built heat-treating equipment has been turning out a better product, saving valuable floor space, reducing materials handling.

Based on satisfactory experience with this equipment, a second similar Selas unit, austempering another electric typewriter component, is scheduled to go into production at IBM this month.

Time-saving, space-saving, materials-saving heat processing equipment is designed and built by Selas to meet your specific needs. If desired, the complete Selas unit may be shipped intact to your plant, ready for insertion into your production line . . . ready, too, to perform its designated heat processing functions immediately upon hook-up to power.

For any type of heat processing, for small or large parts, Selas can design and build automatic or semi-automatic equipment to fit into your production line. To learn how Selas can help you solve your heat processing problems, write Department 11, Selas Corporation of America, Dresher, Pa.

SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers
DEVELOPMENT • DESIGN • CONSTRUCTION

"T-1" Steel cuts cost 15% in 1,199-ft. TV Tower

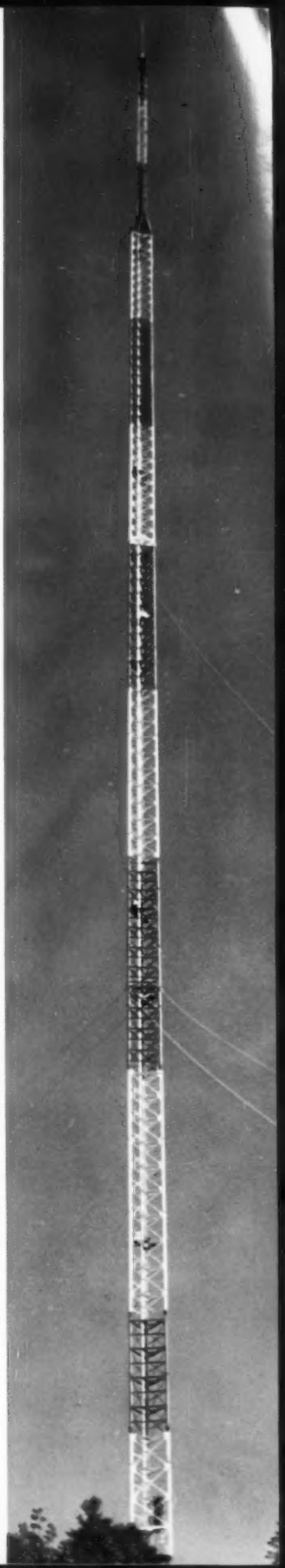
THIS is the new 1,199-ft. WBZ-TV transmitting tower near Boston, Massachusetts. It's unique because up to the 838-ft. level its legs are of USS "T-1" Steel, a constructional alloy steel so strong it made possible significant savings for the tower owner. This structure was designed and built by Dresser-Ideco for Westinghouse Broadcasting Co., Inc.

WBZ's tower presently supports a 6-bay channel 4 antenna, but future plans call for it to carry plenty of additional weight; pending FCC approval, another 300 feet of height will bring it to an ultimate 1,499 feet. The tower had to be built with the strength to accommodate this extra weight without the necessity of future structural modifications.

Round, hot-rolled, heat-treated bars of USS "T-1" Steel were used for the three legs up to the 838-ft. height because this alloy steel has nearly three times the yield strength of structural carbon steel. It therefore enabled Dresser-Ideco to reduce the size of the legs greatly, lowering shipping weight, welding costs, wind stresses and over-all weight and price. For example, consider the leg members at the bottom of the tower. Cross-sectional area of these "T-1" bars is only 56% of the area required with the usual structural carbon steel, resulting in a 44% material savings. Also saved: the cost of hot-forging and machining, since carbon bars of the size required for the biggest members are too large to be produced economically by hot-rolling. *Altogether, the builders estimate that "T-1" Steel cut the cost of this tower by 15%.*

For more information on USS "T-1" constructional alloy steel, contact any office of United States Steel (listed in all phone directories), or write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. For details about the column strength of "T-1," write for free booklet.

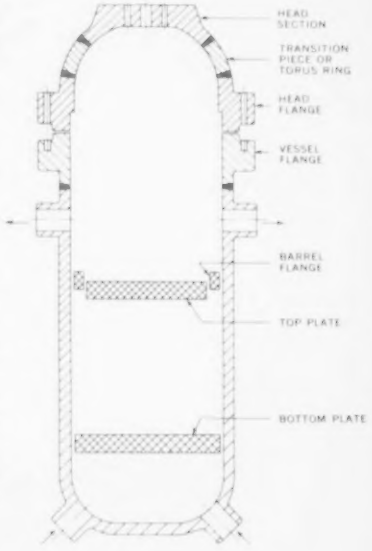
USS United States Steel



Critical-service reactor forgings "routine" at United States Steel

This closure-head forging for a nuclear reactor shell is a good example of how all United States Steel products are made to the tip-top edge of perfection. The reactor operates at very high pressure and is intensely radioactive. More than that, the entire shell, with its eight- to ten-inch-thick steel walls, is welded into a single, sealed unit. Can you imagine the prohibitive cost of replacing or repairing or even *examining* a forging that is in this type of service?

The small drawing shows a typical reactor vessel. "As-forged" diameters of the flange and transition forgings go up to 145 inches. They may be 30 to 50 inches thick, weighing up to 150,000 pounds in the rough. Head pieces, like the one in the big color picture, go up to 96 inches in diameter, 36 inches thick, 87,000 pounds.

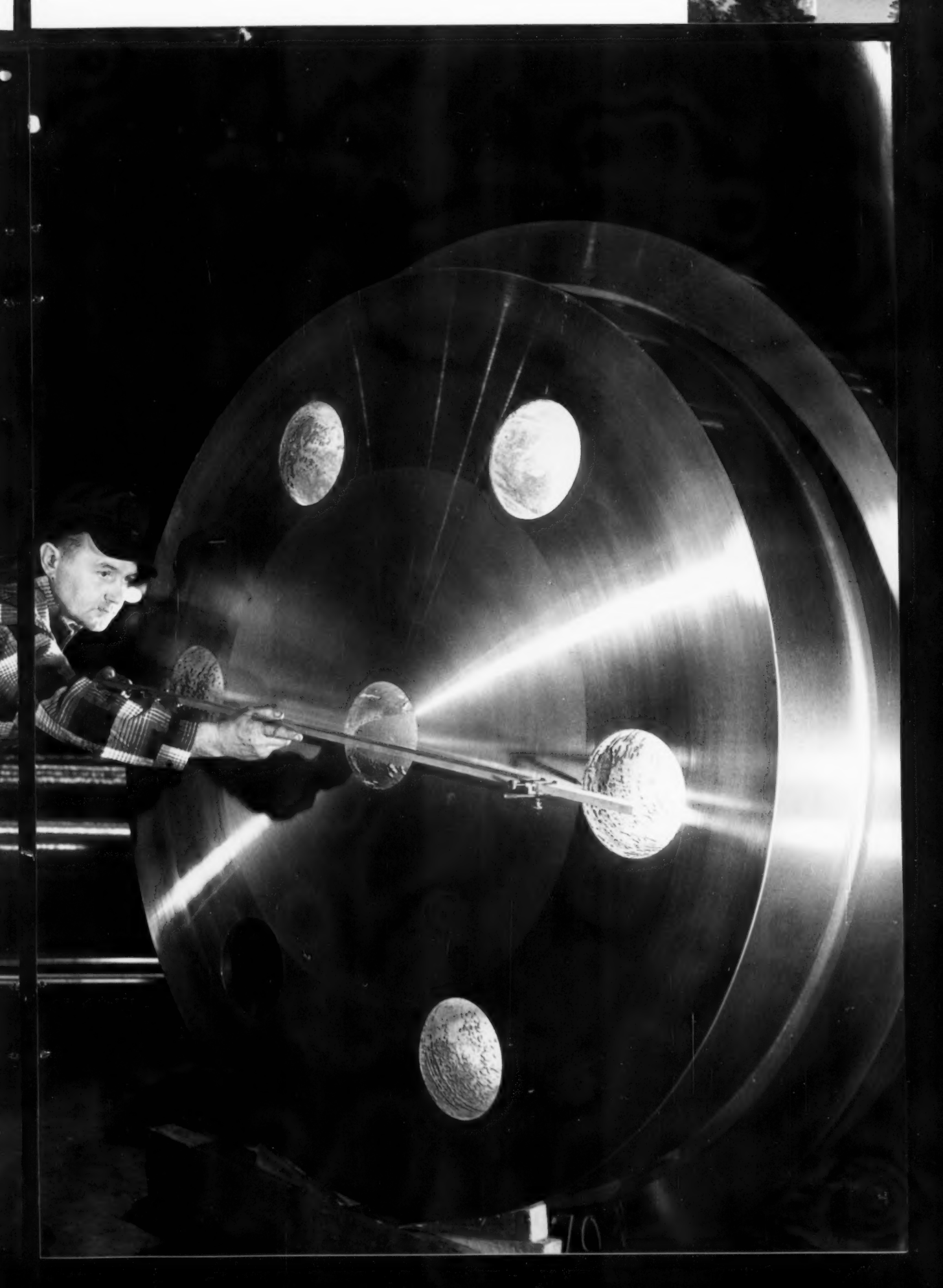


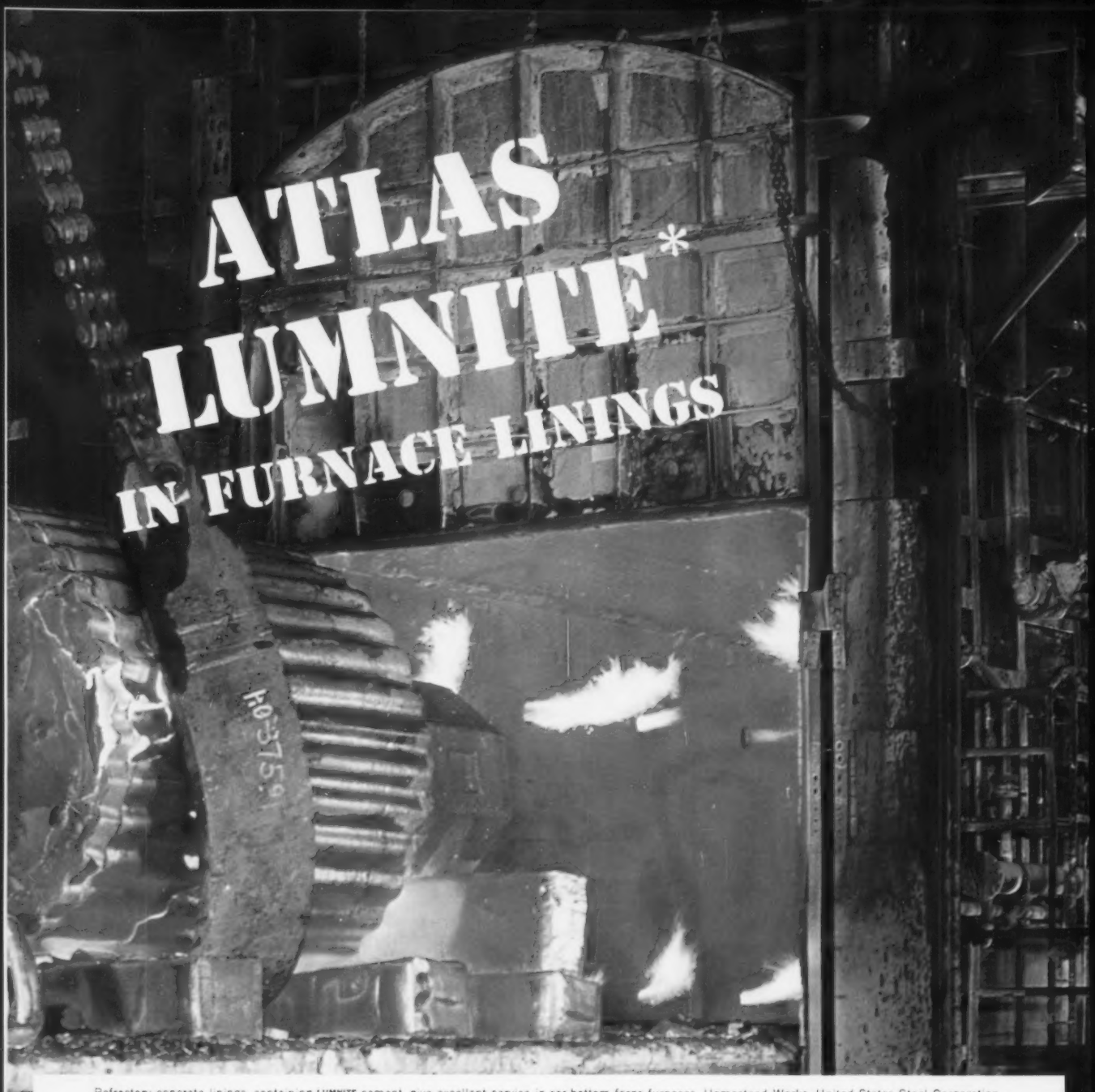
To make these mammoth forgings, we teem manganese-nickel-molybdenum killed steel ingots that may weigh a quarter-million pounds. The ingots are cogged, upset, punched and mandrel-forged (in the case of ring forgings) and are annealed, double normalized, and double tempered—a process that may take as long as 700 hours. Then comes the rough machining on vertical boring mills, and quench and temper heat treatment. Inspection procedures are elaborate: ultrasonic inspection, magnetic particle inspection, plus tangential tensile, Charpy V notch impact, grain size and bend tests.

It's no surprise that so many builders of nuclear equipment specify and depend on USS Quality Forgings. The men of our Homestead Forgings Division who produce these parts have had a great deal of experience turning out equally critical forgings, such as the perfectly balanced shafts for steam turbines and generators. Critical work like this is routine, and perfection is a habit for the men who make USS Quality Forgings.

You get this same quality in *any* forging you order, because the same crew of highly skilled men work on every order, using the same steelmaking facilities and the same shop equipment. If you specify a USS Quality Forging, you can be sure that money won't buy anything better. We'd appreciate your inquiries or requests for our free 32-page booklet on USS Quality Forgings. Write to United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.

USS United States Steel





Refractory concrete linings, containing LUMNITE cement, give excellent service in car-bottom forge furnaces, Homestead Works, United States Steel Corporation, Munhall, Pa. Packaged castable used: Laclede-Christy "Steel Cast," product of Refractories Division, H. K. Porter Co., Inc. Operating temperature: 2200°F.

- Refractory concrete furnace linings made with LUMNITE cement resist extreme variations in temperature and thermal shock due to rapid heating and cooling.
- Construction is fast and easy . . . simply pour refractory concrete into forms . . . service strength is reached within 24 hours.

For maximum convenience, use castables made with LUMNITE cement. These are packaged mixtures, ready for use. Just add water, mix and place. Made and distributed by leading manufacturers of refractories.

For more information, write: Universal Atlas, 100 Park Avenue, New York 17, N. Y.

*"LUMNITE" *is the registered trademark of the calcium-aluminate cement manufactured by Universal Atlas Cement Company*

L-163

UNIVERSAL ATLAS CEMENTS

USS

TRADE MARK

UNIVERSAL ATLAS CEMENT COMPANY—member of the industrial family that serves the nation—**UNITED STATES STEEL**

OFFICES: *Albany · Birmingham · Boston · Chicago · Dayton · Kansas City · Milwaukee · Minneapolis · New York · Philadelphia · Pittsburgh · St. Louis · Waco*

people
buy
Scott Wipers
for
many
reasons:

Scott Wipers are used at RCA-Camden for wiping hands that handle speaker voice coils, wiping powder and dust at coil packing stations, wiping soldering irons on assembly lines, cleaning punch presses. Mr. George M. Cavanaugh, Administrator, Staff Purchasing, is shown here beside an RCA Victor Mark II Hi-Fi "Victrola" which uses four speakers in RCA's Panoramic Sound System.

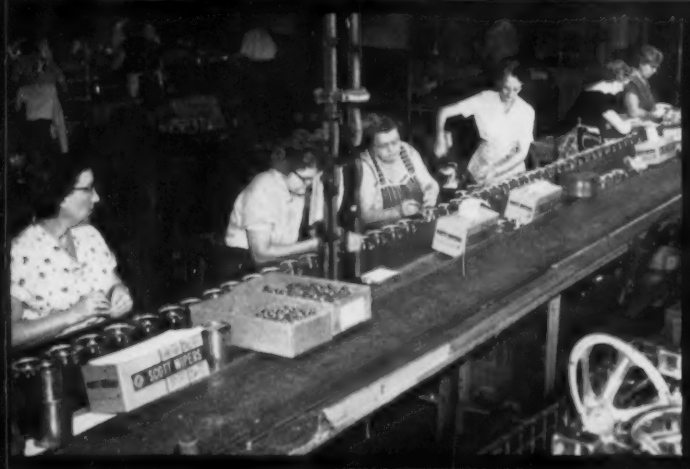
RCA keeps plant cleaner, gets greater wiping efficiency with Scott Wipers!

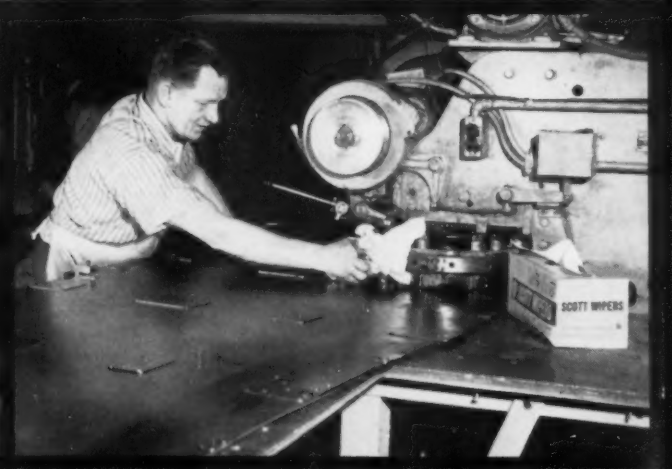
Employees at RCA, Camden, N. J. who produce high quality speakers for RCA Victor Hi-Fi sets, say that Scott Wipers are "easier to use than rags." Lintfree and disposable, Scott Wipers are ideal for wiping excess thermosetting cement off parts (cloth could wipe cement but couldn't be satisfactorily laundered afterwards) . . . for eliminating "fuzz on fingers" after handling cemented parts . . . and for all general wiping jobs from the Speaker Assembly Department to the Tool Shop. Scott Wipers contribute greatly to good housekeeping and help in RCA's constant efforts to produce quality products through expert workmanship, precise engineering and manufacturing methods.

SCOTT PAPER

Maker of the famous Scott paper products you use in your home. See "Father Knows Best" and "The Gisele MacKenzie Show" on NBC-TV.

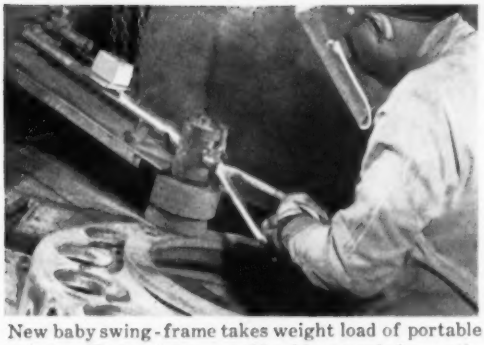
For complete facts and figures on many other users of Scott Wipers, get case histories from your Scott distributor (Yellow Pages: "Paper Towels") or write: Scott Paper Company, Dept. IA-81, Chester, Pa.





His new grinding technique

Twenty-eight years ago Jack O'Sullivan was running a swing-frame grinder for Crucible Steel... now he's President of Engineered Sales Co., one of New Jersey's largest abrasive distributors. He knows grinding from the operator's point of view and from the cost accountant's.

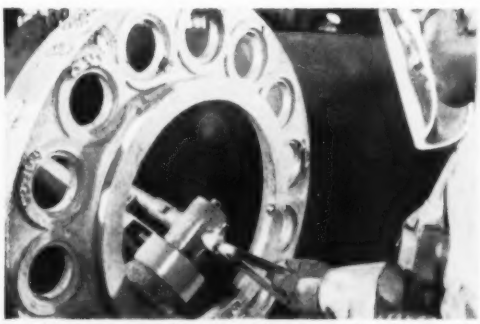


New baby swing-frame takes weight load of portable grinder off operator . . . enables him to grind smooth, flat surface without accidental scars and nicks due to fatigue.

Big foundries have big grinding problems. For example, Cooper Alloy Corporation, pioneer in the production casting of stainless steel valves and fittings, had this one: they found that some grinding jobs just couldn't be done with big swing-frame grinders. Yet they were backbreakers when done with portables . . . expensive, too.

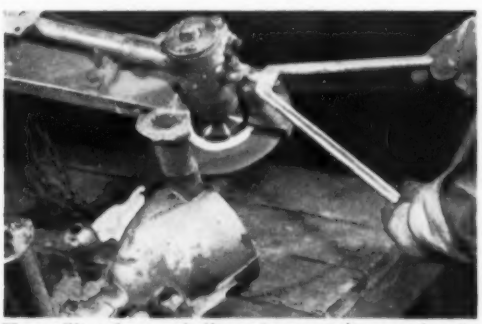
cuts costs and back-aches

They *were*, that is, until Bay State distributor Jack O'Sullivan came up with an idea. Working with Bay State and Fox Grinders, Inc., he devised a baby swing-frame that used the conventional cup and raised hub disc wheels normally used only on portables. This enabled Cooper's operators to grind hard-to-reach surfaces and notch or cut off sprues, gates and risers . . . without fatigue . . . and with a great deal more speed and accuracy.



Tricky I. D. grind demands a light, precise touch with a coarse-grained cup wheel (tapered or straight). Operator is free to concentrate on accuracy.

Like Jack O'Sullivan, *all* Bay State representatives are more than just grinding wheel salesmen. That's why they often come up with ideas that result in basic operating improvements. Why not call in *your* Bay State man? **Better grinding at lower cost – that is his business.**



Versatility of new grinding set-up permits operators to use Bay State raised hub disc wheels ("hat" wheels) for notching and cutting off sprues, gates, risers.

BAY STATE
WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts. *Distributors:* All principal cities.
In Canada: Bay State Abrasive Products Co., Ltd., Brantford, Ontario.
Branch Offices and Warehouses: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh.

STRIPPIT *tooling versatility*

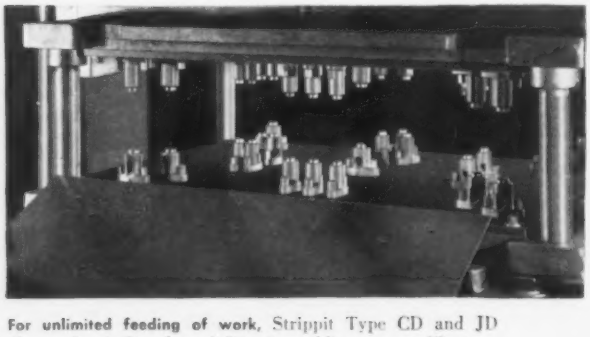
keeps presses working, not waiting!

Nothing to mount on the ram, nothing to align or adjust — just place your Strippit setup in the press and start the run.

That's how Strippit versatility pays off. Any good bench man can mount these independent self-contained punching and notching units in any template pattern within press capacity. New Strippit setups can be kept ready for the press, virtually eliminating down-time.

For flatwork, extrusions, structurals from the smallest gauge to 3/4" mild steel, Strippit gives you these extra advantages:

• The effect of quick-change dies without die-making or die-spotting • Speed over drilling — plus no deburring • Units re-usable over and over • Readily removable punches and dies • Ease, accuracy of template mounting — pilot pin centered on punch • Each unit complete — permanently aligned, fully guided, self-stripping.



For unlimited feeding of work, Strippit Type CD and JD (heavy-duty) Punch and Die Assemblies are readily template-mounted to press ram and bed in any desired pattern.

Write today for all details and a demonstration by a Strippit mobile unit at your plant.

Special tools made up to your specifications.
Warehouse facilities in Chicago and Los Angeles.

HOUDAILLE

WALES STRIPPIT COMPANY
202 Buell Road, Akron, New York

One of a complete line of Strippit vertical and horizontal hole punching units in capacities from the lightest material to 3/4" mild steel. Wide choice of die heights, shut heights and throat depths.

Also, 90-degree Corner Notching Units in 3" x 3" and 5" x 5" sizes, plus V, Radii and many special shape notching units. Capacities to 1/8" in mild steel.

Manufactured in Canada by Strippit Tool & Machine Limited, Brampton, Ont.

American Laundry Machinery Company steam chests, cast with Hanna pig iron, need no plating. Instead, the casting is machined, ground and buffed to satin smoothness.

HANNA PIG IRON helps American Laundry Machinery Company iron flatwork fast and smooth

Laundrymen all over the country rely on equipment made by American Laundry Machinery Company for smooth, fast, large-volume ironing. They know that American Laundry Machinery Company's exacting quality standards assure good results with a minimum of wear.

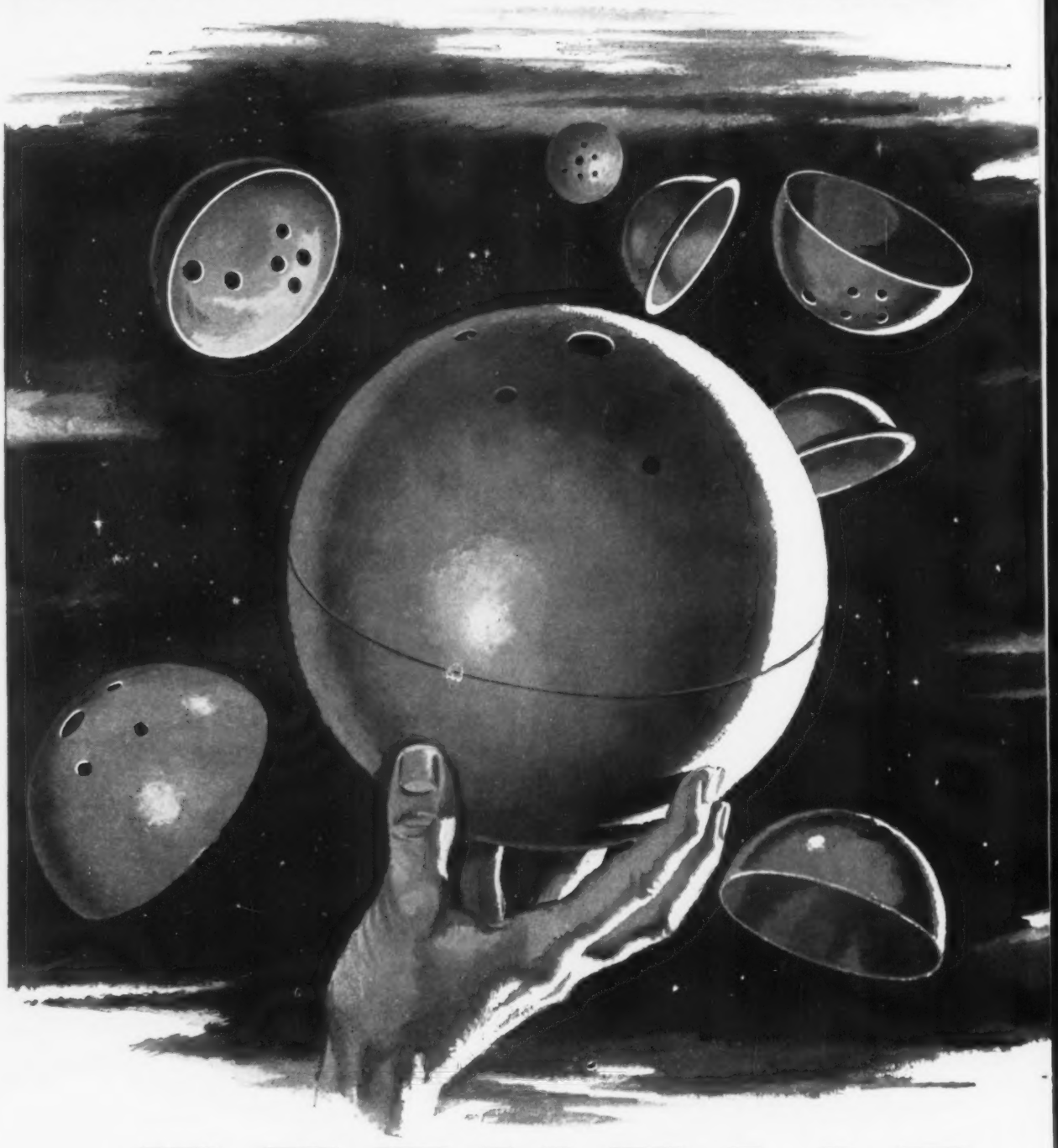
Ever since the opening of their foundry in Rochester, New York, American Laundry Machinery Company's material specifications have called for Hanna pig irons. Since its development, the even higher strength HannaTite Pig Iron has been specified. This is a step taken to maintain the high quality required in such work as this flatwork ironer steam chest casting—a pressure vessel that must safely hold dry, saturated steam at 125 lbs. per square inch gage pressure. This application requires castings that upon machining are flawless and uniformly smooth—a specification met by the tight, fine-grained, pearlitic structure of HannaTite Pig Iron.

Hanna's high metallurgical qualities are synonymous with denser, stronger castings. Hanna makes all regular grades of pig iron, as well as HannaTite and Hanna Silvery. All grades are available in two sizes—the 38-pound pig and the smaller HannaTen ingot. Hanna representatives are always happy to be of service.

HANNA
THE BEST KNOWN NAME IN IRON

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

HEMISPHERES FABRICATED



REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

FROM REPUBLIC TITANIUM

Are Strong, Lightweight, Defy Corrosion at Temperatures Below –150° C.

The hemispheres are used in highly specialized aeronautical applications calling for high strength, light weight, and resistance to the severe corrosive action of liquified gases at super sub-zero temperatures.

To meet these requirements, Alloy Products Corporation, Waukesha, Wisconsin, utilizes three major advantages of Republic Titanium in fabricating the parts. (1) Titanium's lightweight advantage reduces weight without sacrifice of strength or safety. In fact, titanium offers the highest strength-to-weight ratio of construction metals. (2) This exceptional high-strength feature of titanium withstands burst pressures in excess of 2,000 lbs. p.s.i. (3) Titanium's extremely high corrosion-resistant properties defy the corrosive action to which the units are constantly exposed.

Alloy Products draws circular blanks of commercially pure Republic Titanium, Type RS-70, into hemispheres. The edges are trimmed and holes pierced for instrument and component part connections. Then an extruding operation is performed on the pierced holes. Finally, the hemispheres are welded together into one tough, strong, corrosion-resistant sphere.

The entire fabricating operation is performed without difficulty and with little change in procedure as compared to other materials of construction.

Does this application of Republic Titanium suggest an idea for your product that needs to be strong, lightweight and corrosion-resistant? Republic Metallurgists are ready to help you apply titanium's advantages now. There's no obligation. Mail the coupon today for more information.

STRONG, LONG-LASTING DRIVE GEARS made from Republic Cold Finished Alloy Steel meet heavy-duty service requirements in this Black & Decker portable electric saw. These fine steels offer superior toughness and strength to withstand shock, stress, and fatigue. An exceptionally high strength-to-weight ratio permits design of thinner sections to save weight and hold down size without sacrifice of needed strength. The added advantage of cold drawing provides a bright, smooth finish, accurate size, cross-section, and straightness, plus superior ultimate strength, yield point, hardness and machinability. Our metallurgists and machining specialists will help you apply these fine steels to your product efficiently and economically. Write.

NEW FABRICATING PROCESS Republic Die-Form, can save you 1 out of 3 tons of steel. The automotive transmission shaft, shown above, proves this point. Using Die-Form, 200 tons of cold finished blanks produced parts formerly requiring 300 tons. Die-Form is a new method of cold forming hot rolled carbon, alloy or stainless steel bars into multi-diameter bars ready for final finishing. It permits major savings in time, material, and money in mass produced, multi-diameter machine shafts. Since Die-Form closely approximates the final part, only finishing cuts and/or grinding are required for completion. Scrap loss is minimized—production rate increased. Republic Booklet ADV-746 describes the capacities and limitations of this amazing new process. Send coupon for your copy.

REPUBLIC STEEL CORPORATION
DEPT. C-3819-A
3104 EAST 45th STREET • CLEVELAND 27, OHIO

Send more information on:
☐ Titanium ☐ Die-Form ☐ Cold Finished Alloy Steels

Have a metallurgist call.
☐ Titanium ☐ Alloy

Name_____ Title_____

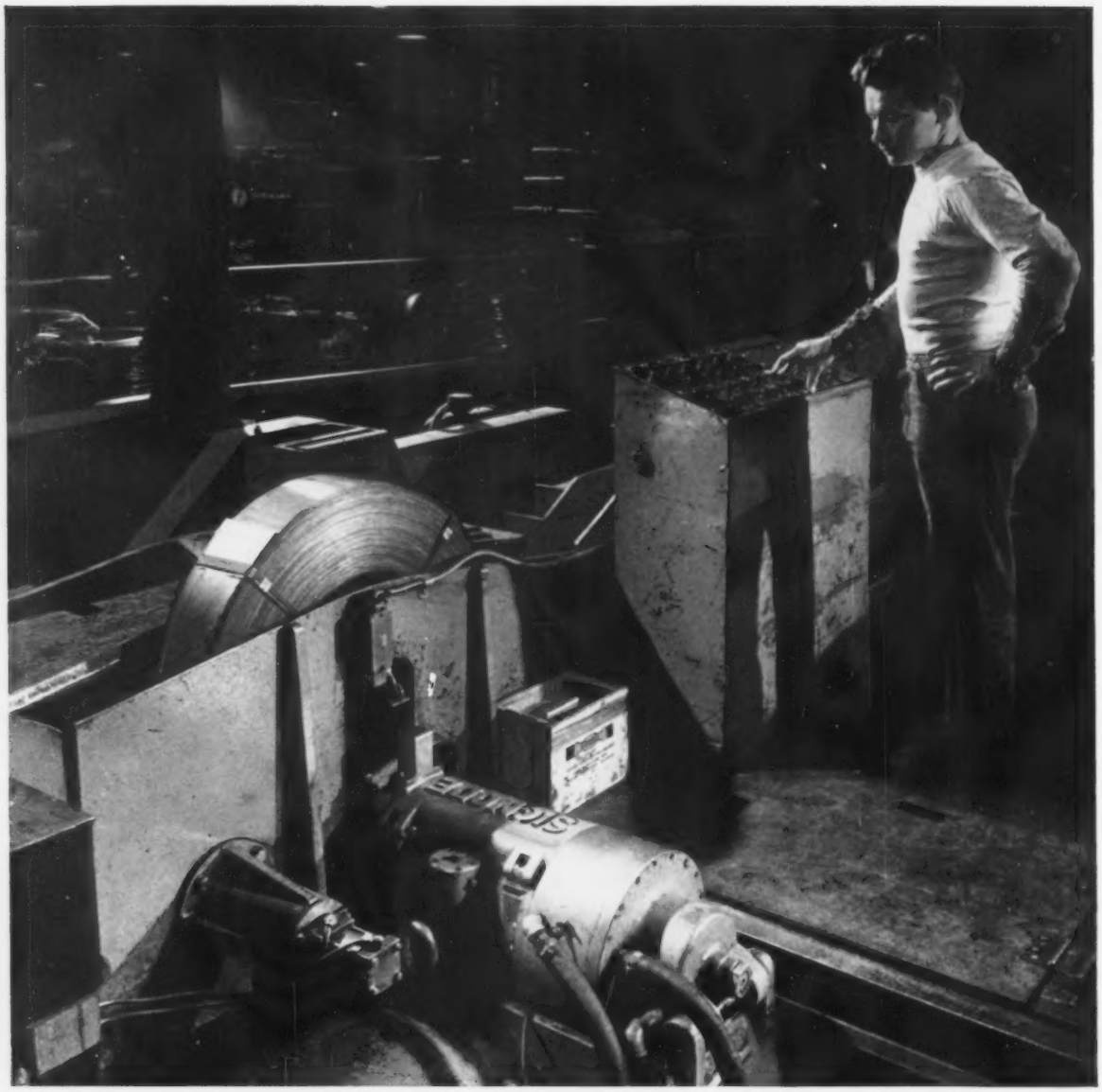
Company_____

Address_____

City_____ Zone____ State_____

STEEL

and Steel Products



They handle steel . . . with care

This man and Signode's Model MH10 power strapping machine are applying four steel straps to a coil of strip steel. The operator has fast push-button control of strap placement and the strapping action. To position the coil, the machine turns it in the direction that tightens the outer laps. Air-operated plates squeeze the sides of the coil to square it up. Surface finish of the steel is protected. Edges aren't damaged in handling or transit. There's no waste. The coil is worth more, whether it's yours as manufacturer or destined to be yours as receiver. Protection of product integrity to destination is one way Signode makes things cost less to handle, store, ship and receive. For more ways, call the Signode man near you, or write:

SIGNODE STEEL STRAPPING CO.

2623 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

CUT COSTS ...SPEED DRILLING OPERATIONS

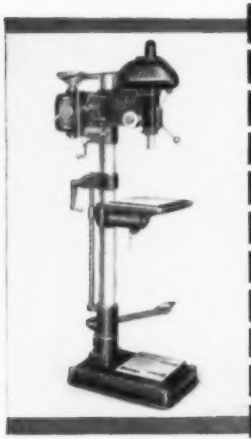
with "BUFFALO" DRILLS

The enthusiastic industry-wide acceptance of the No. 1 "RPMster" is a matter of quiet pride with us at "Buffalo". First, we found out what you people in the industry wanted . . . as the ultimate in drill features. Then, we drew upon our 80 years of engineering experience to design these most-wanted advantages into this "drill to surpass all previous drills".

The results speak for themselves. Here, in the "Buffalo" No. 1 "RPMster" are *all* the benefits you wanted most. You'll find extreme accuracy, high output, complete convenience. The ingenious gearless drive offers the widest range of spindle speeds, from 100 to 3000 . . . instantaneously adjustable. Operation is so effortless, quiet, versatile and vibrationless that you'll have to operate it yourself before you'll believe it's possible.

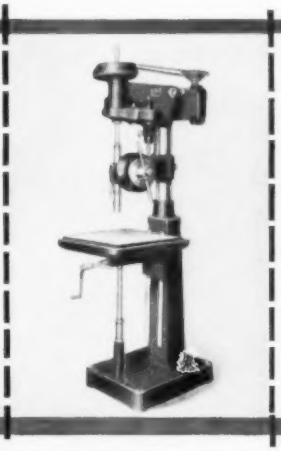
Phone your nearest "Buffalo" Machine Tool Dealer for a demonstration of the No. 1 "RPMster" . . . or write for Bulletin 3967-A.

- 1001 SPEEDS
- FLEXIBILITY
- ACCURACY
- DEPENDABILITY



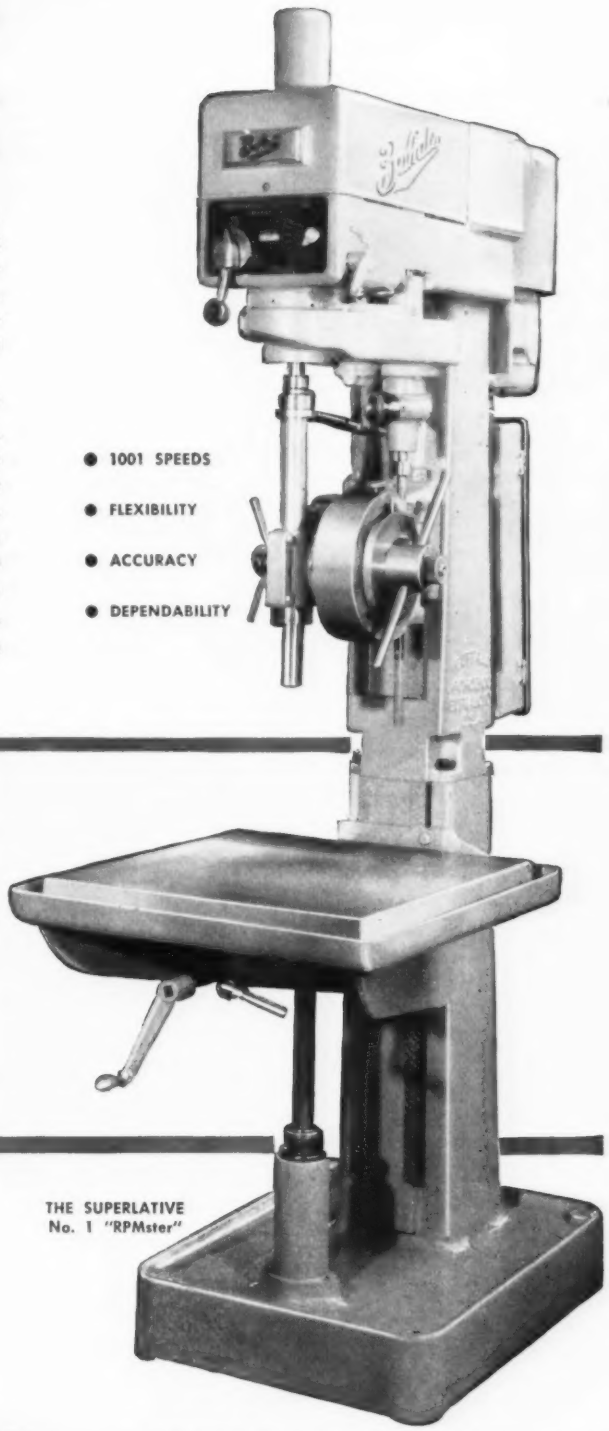
"Buffalo" No. 18 DRILL

Easy to operate, the No. 18 is a high-grade, stationary-head, general-purpose drill. Suitable for shop or production work up to 1-inch cast iron. Nineteen models available in bench and floor types, with multiple units up to 6 spindles in pedestal type. For full details, write for Bulletin 3123E.



"Buffalo" No. 16 DRILL

You get a lot in the No. 16 Drill — high sensitivity and accuracy, combined with rigid, durable construction. Ideal for shop or production work, it's available in 8- 12- and 15-inch overhang — in bench, floor or pedestal types — in multiple units up to 6 spindles. Write for Bulletin 2730G.



THE SUPERLATIVE No. 1 "RPMster"

Engineered into every "Buffalo" Drill is the famous "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.

DRILLING • PUNCHING • SHEARING • BENDING

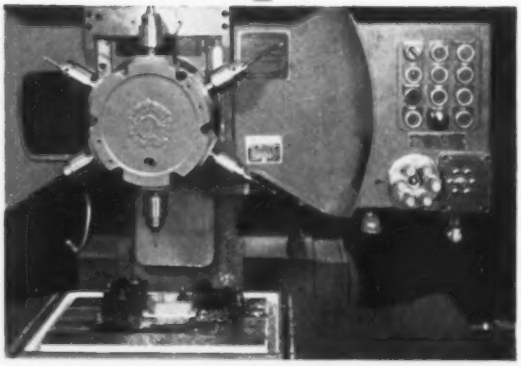
"Buffalo"

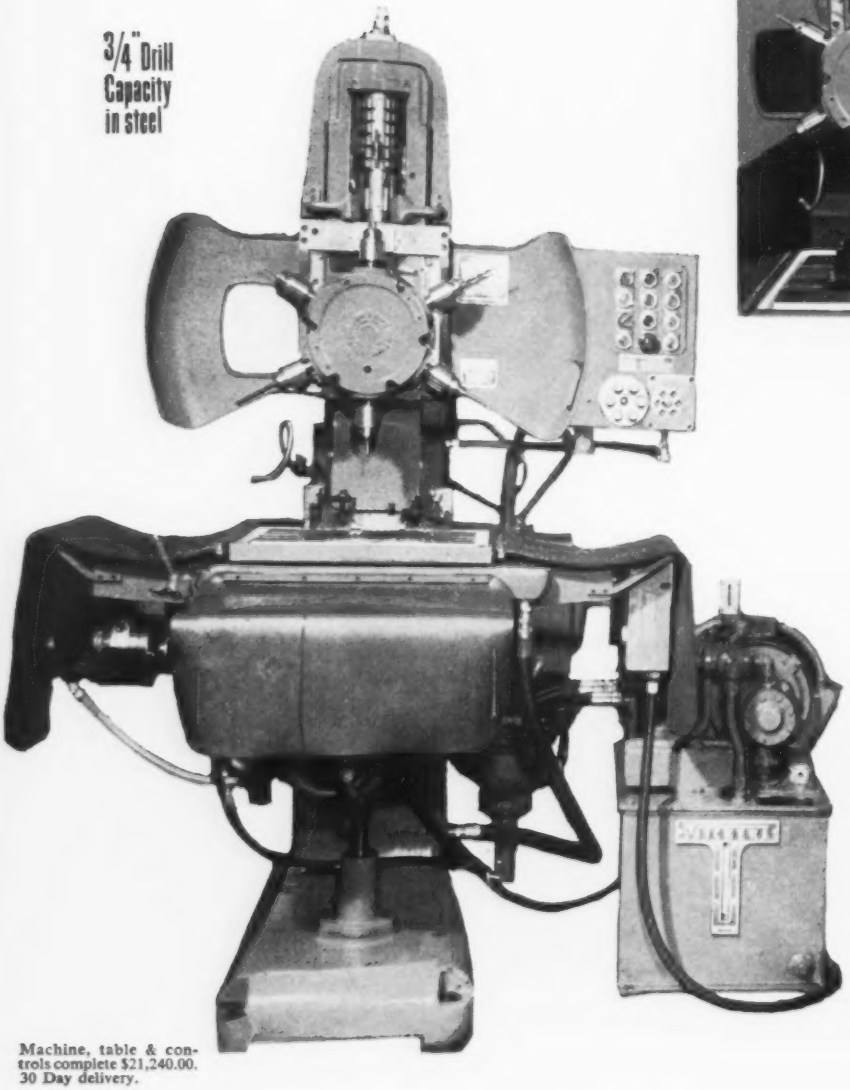
BUFFALO FORGE COMPANY
492 BROADWAY • BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

50% Less Machining Time!

Burgmaster Electropoint

3/4" Drill Capacity in steel



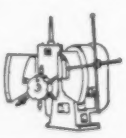


Machine, table & controls complete $21,240.00. 30 Day delivery.

Specialists in High Production Turret Drilling

1C Manual Power Index 3/8" Capacity

2B Manual Power Index 3/4" Capacity



2BF Flange Mounted Power Index 3/4" Capacity

2BH Automatic Hydraulic 3/4" Capacity

3BH Automatic Hydraulic 1½" Capacity

2BR Ram Type Radial Drill 3/4" Capacity

2BHT-3BHT Automatic Tape Controlled 3/4" and 1½" Capacity

50% Less Tooling Costs and Lead Time!

Six-Spindle Turret Drill

with *Automatic* Numerical Controlled Positioning Table

Aircraft instrument gear housings are now precision drilled and bored with 50% less machining time and 50% less tooling cost and lead time on a Burgmaster Electropoint Six-Spindle Turret Drill. Six different operations including center drilling, drilling, reaming, and boring, 5 different diameters, and 12 holes are machined in 3½ minutes floor to floor within ±.001" location. But this is only part of the story.

1. The Automatic Cycle eliminates fatigue—and produces consistent accuracy with practically no scrap loss.

2. Fixture rework time which averages six weeks can now be handled in five minutes—Just Scotch tape old holes on the control tape and punch in the new data.

3. Only simple holding fixtures are required—eliminating drill and reamer bushings and expensive jig boring time to fabricate—reduces lead time 50%.

4. Tools run at most efficient preselected speeds and feeds—greatly extends tool life and eliminates tool breakage.

5. Quick set-up permits economical machining of small lots—and provides extreme flexibility and versatility.

The Burgmaster Electropoint Control System may be applied to either new 2BHT-6 spindle or 3BHT-8 spindle Turret Drills or machines now in service. The standard hydraulic Burgmaster controls are maintained including pre-selective spindle speeds, infinitely variable pre-selective feeds, selective rapid approach and return, skip indexing, precision depth control, and simple manual controls for set-up. The Electropoint System automatically controls all machine functions, selects spindles in any sequence, automatically positions the table simultaneously on two axes, and clamps it in position while machining operations are being performed. All operations are carried out at their most efficient rate for high finish, precision, speed, and longest tool life.

Check into Burgmaster Electropoint Tape Controlled Turret Drilling, Tapping, and Boring Machines for your work. They can save you money from prototype to mass production work. There is a Burg direct representative or dealer near you. Call him—there is no obligation.

JOB FACTS

Machine: Burgmaster Electropoint 2BHT—6 Spindle Turret Drilling, Tapping, and Boring Machine.

Part: Aircraft Instrument Gear Case.

Material: Aluminum alloy.

Quantity: 200

Holding: Simple Locating and Clamping Fixture.

Accuracy: Within ±.001" Without Bushings.

Accuracy Required: ±.0025".

Tools: H.S.S.

Program Part: 1½ Hours.

Punch Tape: 15 Min.

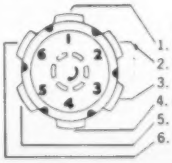
First Set-up Time: 1½ Hours.

Floor to Floor Time: 3½ Min.

Former Method: 6 Spindle Table Type Drill.

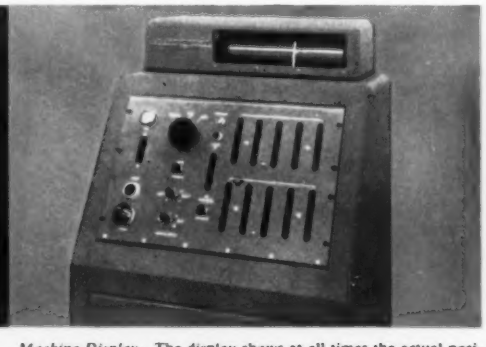
Former Time: 7 Min.

Savings: 50% Floor to Floor Time, and Floor Space.



Operations	Diameters	Feed per Min.	Speed RPM
1. Center Drill	4 Holes at Top	.004	1500
2. Drill 4 Holes	.139/.135 x .563 Deep	.004	2000
3. Drill 4 Holes	.183/.179 Thru	.005	1300
4. Ream 4 Holes	.180/.181	.008	1000
5. End Mill 3 Holes	.260/.250 x .164 Deep	.005	1000
6. Drill 1 Hole	.340/.330 Thru	.006	650

Tape Preparation—Decimal numbers and machining sequence date are punched directly into the tape (requiring no special training, codes, or computers) at an average rate of one minute per command block.



Machine Display—The display shows at all times the actual position of the table to three decimal places and the number of the operation being performed in the machining sequence. The display reads Table Positions +.0000 to −.0005. The system provides "Manual Control," "Semi-Automatic Control," "Automatic Control," or Standard Burgmaster Automatic Hydraulic Control.

Write for bulletin describing Burgmaster six and eight spindle Electropoint Tape Controlled Turret Drilling, Tapping, and Boring Machines. Thirty minute 16MM sound film showing all Burgmaster Turret Drills in operation available from any office without charge.

Dept. 3.

BURG TOOL

MANUFACTURING COMPANY, INC.

15001 South Figueroa Street, Gardena, California

FAculty 1-3510 DAvis 9-4158

BURGMASTER DIRECT SALES OFFICES:

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LYtle 1-0309

Plus dealer representatives in other industrial centers.

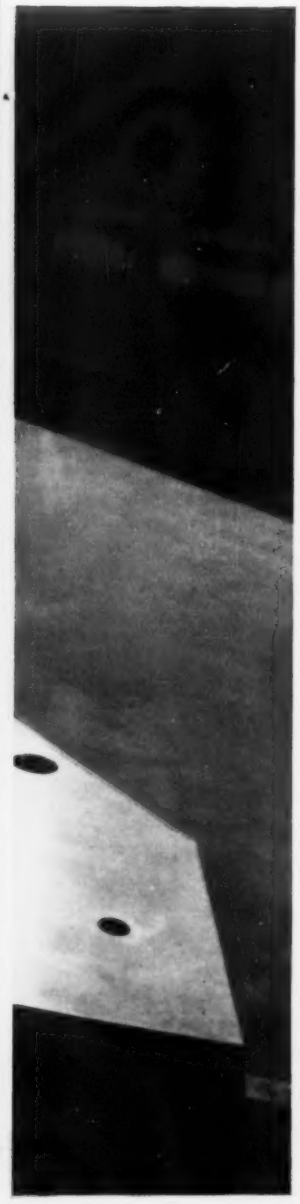
When you buy from U. S. Steel

STEEL + PLUS IN ACTION: FACILITIES

The purest commercial steel obtainable is in these parts for a 100", double-focus, mass spectrometer magnet. We made the steel, poured it in one huge ingot, formed it and machined it. Both parts were machined flat and parallel with less than a .001" variation. The ends are within .002" of a true square. The surfaces were polished to a 30-micro-inch finish! It took complete steel-making facilities to meet these "almost impossible" specifications required by the Argonne National Laboratory.

American Bridge • American Steel & Wire and Cyclone Fence • Columbia-Geneva Steel • Consolidated Western Steel • National Tube Oil Well Supply • Tennessee Coal & Iron • United States Steel Homes • United States Steel Products • United States Steel Supply United States Steel Export Company • Universal Atlas Cement Company

you get STEEL + PLUS



STEEL + PLUS IN ACTION:
RESEARCH

The head of a pin would appear about 47 feet in diameter if examined under this instrument. It's an X-ray probe micro-analyzer now in use at U. S. Steel's Fundamental Research Laboratory at Monroeville, Pa. U. S. Steel's Research teams use it to study the microstructure and behavior of steels for today's *and tomorrow's* special uses.

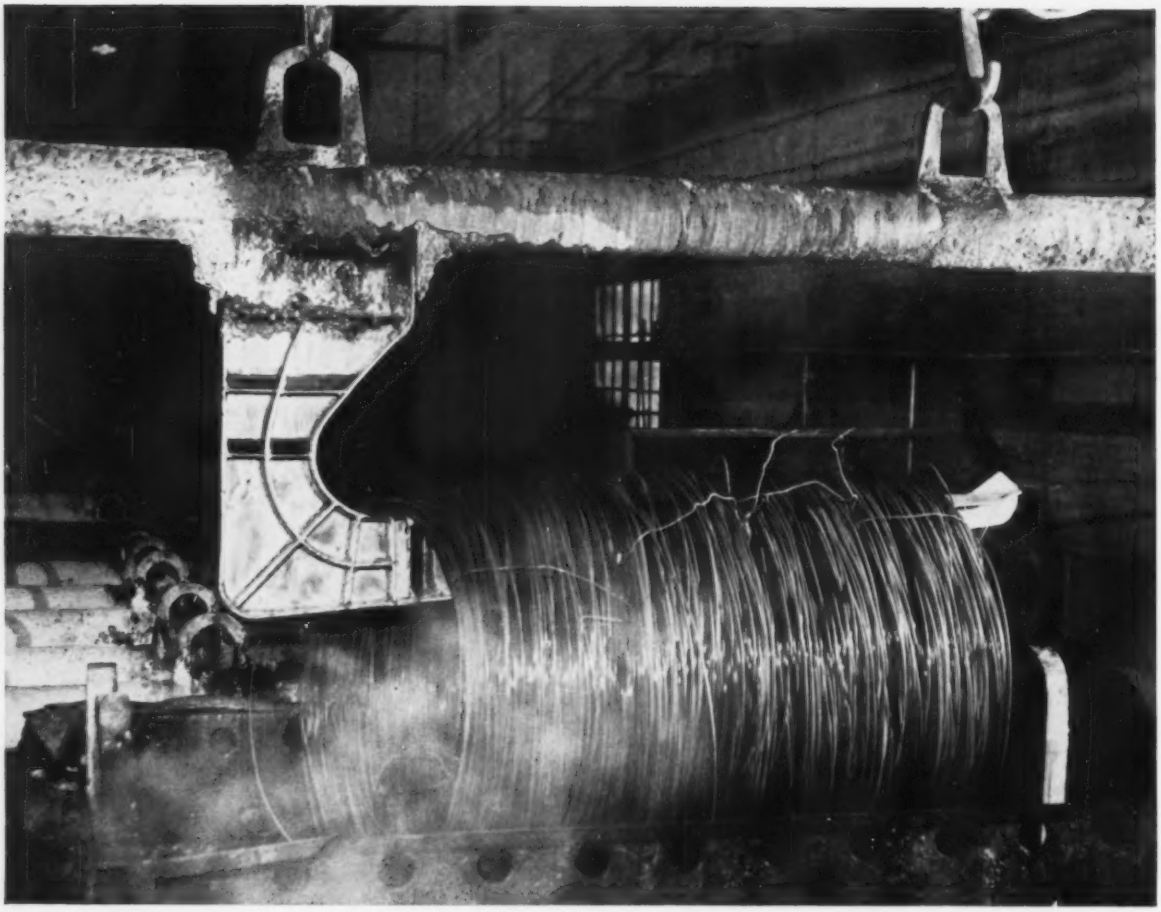
STEEL + PLUS IN ACTION:
MARKETING ASSISTANCE

"Practical Dreamer" is the title of U. S. Steel's technicolor movie promoting steel products for modern kitchens. It will be seen by thousands of kitchen-planners at theaters, clubs, and on TV. Result: Increased demand for the kitchen products made by our customers.

STEEL + PLUS IN ACTION:
TECHNICAL ASSISTANCE

The *River Queen's* 55-cubic-yard bucket can scoop up 80 tons in one bite! It's the biggest shovel ever built by Bucyrus-Erie Co., heavier than a Navy destroyer and as high as a thirteen-story building. USS American Steel & Wire Division designed and made a wire rope strong enough to handle the tremendous stresses. It's flexible, as well as abrasion-resistant, so it gives long trouble-free service.

USS **United States Steel**



Monel Pickling Hooks give improved service life at Colorado Fuel and Iron

Pickling hooks were a major problem for the Colorado Fuel and Iron Corporation. They corroded too fast.

So Colorado decided to try Monel* nickel-copper alloy pickling hooks. The result? The photo above gives you the answer. This hook has been on the pickling line five years, three shifts a day – yet you can see its excellent condition. Today, this Monel hook is expected to outlast predecessors by a wide margin.

Monel hooks last longer because Monel has excellent resistance to corrosion by sulfuric acid pickling solutions. Monel alloy is strong and tough. In fact, it's the strongest nonferrous metal you can use for pickling equipment.

Monel hooks save money other ways, too

This combination of strength and corrosion resistance saves money in several ways. Besides longer life, it permits greater payloads. And because Monel alloy is readily fabricated and welded, a hook can be quickly and economically repaired if it's damaged. Or it can be rebuilt to extend service life even further.

Improves other pickling equipment, too

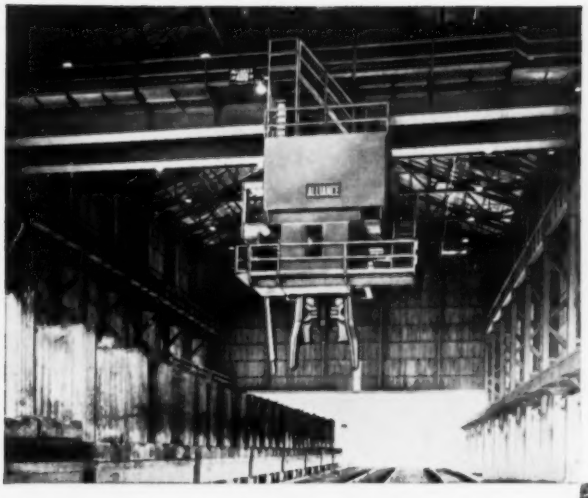
Not only in hooks, but in *all* pickling equipment – slings, chains, bolts, tie-rods – Monel alloy can save you money . . . cut deadweight, outlast other materials. To get an idea of savings you can expect, write Inco for a copy of a useful 32-page handbook, "Equipping the Pickle House for Greater Production at Lower Cost."

*Registered trademark

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

INCO

INCO NICKEL ALLOYS

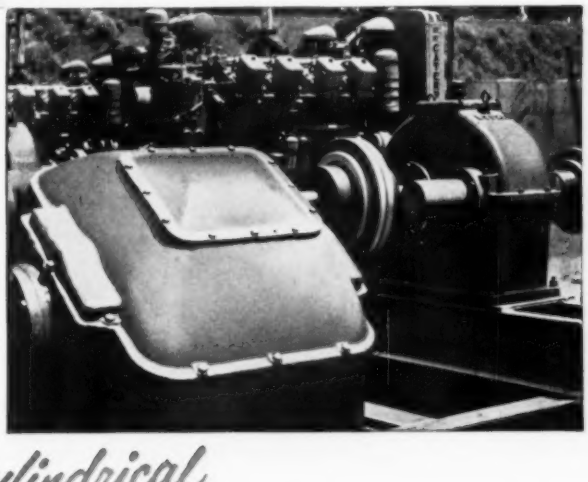


THE HEAVIER THE LOAD...

the more you need HYATTS . . . because you get more sheer load-carrying capacity with straight cylindrical roller bearings than with any other type. HYATTS give outstanding service in this 400-ton stripper crane.

THE HIGHER THE SPEED...

the more you need HYATTS . . . because carburized races, electronic control of eccentricity and internal clearances, and uncompromising final inspections assure smoother performance in speed reducers like this one.



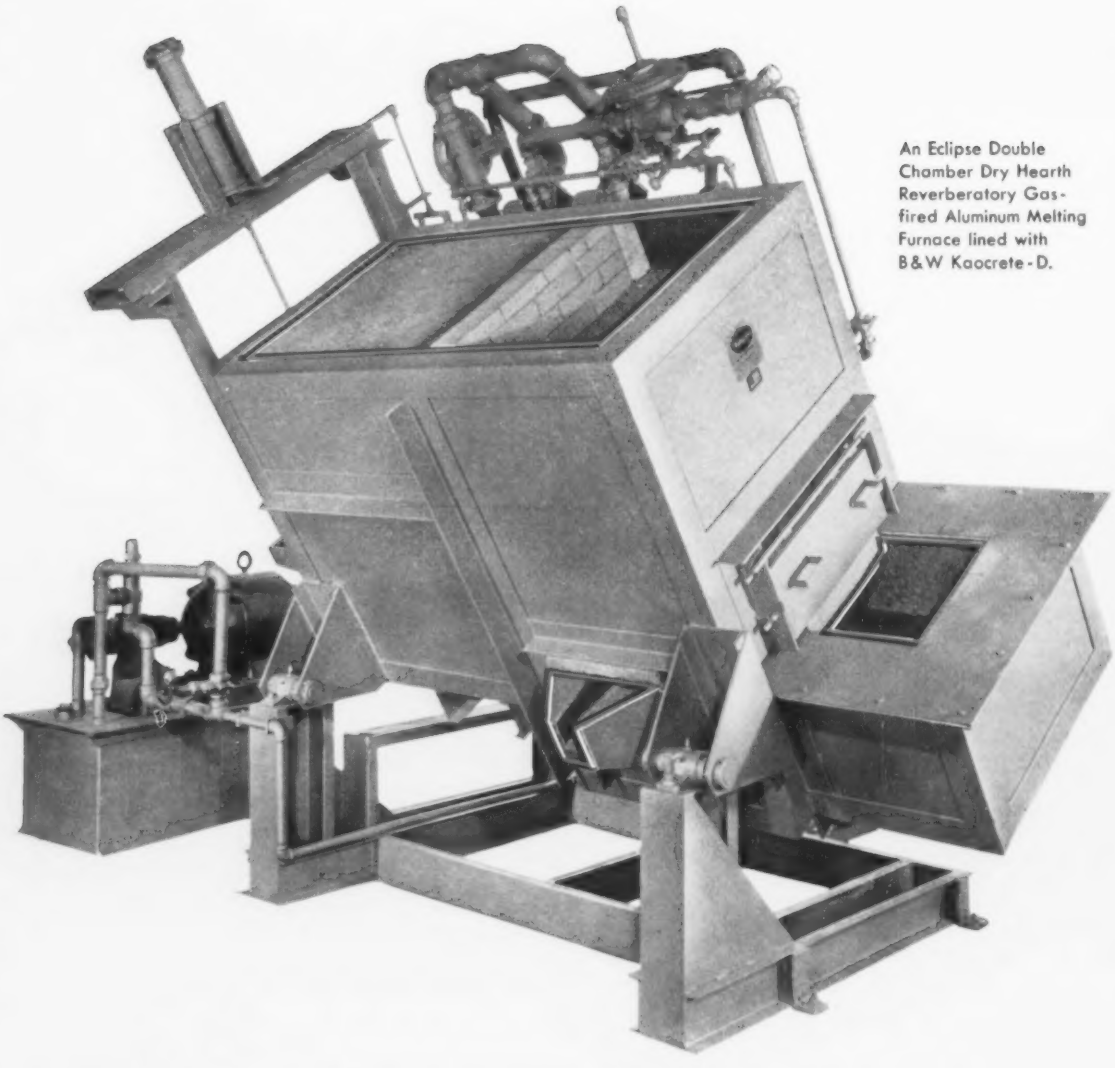
THE MORE YOU NEED *Cylindrical* HY-ROLL BEARINGS

Loads are growing heavier, speeds are growing higher in many types of machinery today—and at the same time designers must often *reduce* overall size. Here's where HYATT Hy-Rolls have it all over limited-capacity bearings—especially when you eliminate either inner or outer races of separable HYATTS and operate the rollers directly on the hardened and ground shafts or housing bores. It's a smart way to save added space without sacrificing load capacity. Ask your nearest HYATT Sales Engineer for recommendations.
Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.; Pittsburgh; Detroit; Chicago; and Oakland, California.

THE RECOGNIZED LEADER IN CYLINDRICAL BEARINGS

1908–1958 GM FORWARD FROM FIFTY

HYATT HY-ROLL BEARINGS FOR MODERN INDUSTRY



An Eclipse Double Chamber Dry Hearth Reverberatory Gas-fired Aluminum Melting Furnace lined with B&W Kaocrete-D.

Eclipse builds aluminum reverbs lined with B&W refractories

B&W Kaocrete-D provides a rugged refractory lining in this gas-fired aluminum melting furnace built by Eclipse Fuel Engineering Company of Rockford, Illinois. Equipped with an hydraulic tilting mechanism for pouring large sand castings or transferring molten metal to a holding furnace or large ladle, the furnace has separate melting and holding chambers lined with B&W Kaocrete-D.

Eclipse installs this B&W Refractory Castable in their aluminum reverbs because it provides three important benefits:

(1) The melting chamber is easy to clean since metal does not build up on or adhere to the face of B&W Kaocrete-D. That's because this refractory castable is non-wetting. Metal penetration of the contact face is kept at a minimum because of the low permeability of the castable. The refractory walls of the furnace do not require excessive scraping.

(2) B&W Kaocrete-D has unusually high strength. Combined with high density, this enables Kaocrete-D to withstand the abrasion of cleaning tools and the considerable physical abuse of charging.

(3) Kaocrete-D is easy to install. The refractory castable is simply poured and rodded in the furnace shell.

This is only one of the many applications of B&W Refractory Castables in a wide range of industrial furnaces. Why not investigate the advantages of these *specialized* refractories in your furnace designs?

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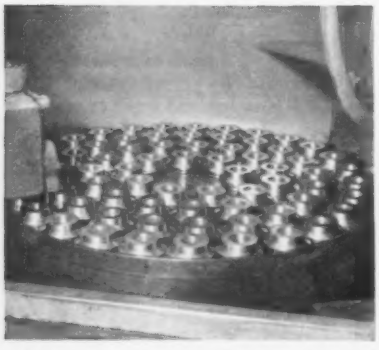
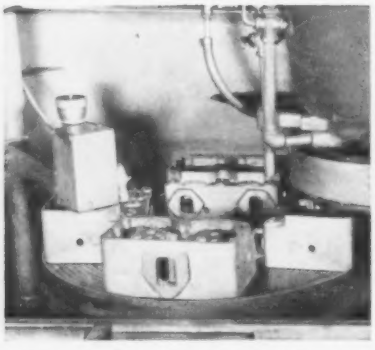


200 adjusting screw washers are ground on one side in one hour. Stock removal .025"; limits ± .001".



Tops of cylinder heads ground 21 per hour; stock removal 3/16" to 1/4". Bottoms 55 per hour; stock .012"; limits ± .001".

56 cast iron plates are ground on one side in one hour. Stock removal .140"; limits .001".

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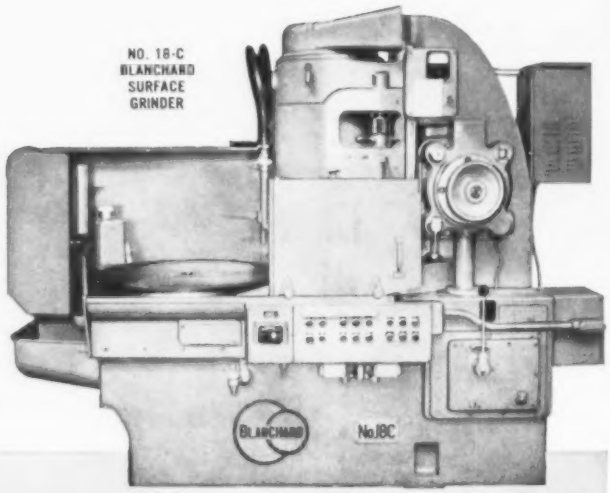

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Tramrail Transfer Cranes Provide Speed and Economy for Dominion Bridge

DOMINION Bridge Co., Ltd., is the largest steel fabricating company in Canada. It is engaged in many phases of steel fabricating work including that of building heavy overhead cranes. For this reason, it knows the need of quality materials handling equipment and how to recognize it.

Their new Mount Dennis plant in Toronto was built primarily for the fabrication of heavier plate and welded steel structures. It has a completely electrified Cleveland Tramrail system in the preparation bay which can handle loads up to 20 tons when its four cranes are worked together.

The cranes are 5 tons capacity, 3-runway, 36 and 40 feet long. They operate individually, or two cranes on adjacent runways can be locked together as a unit. Then both cranes travel together on the two 3-track runways and respond to the push-button station, suspended from the hoist carrier, like a single crane. The ability to use two or four cranes together is extremely helpful when handling large fabricated structures like the 100-foot truss illustrated.

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MOLY NEWS

CLIMAX MOLYBDENUM, 500 FIFTH AVENUE, NEW YORK 36, N. Y.

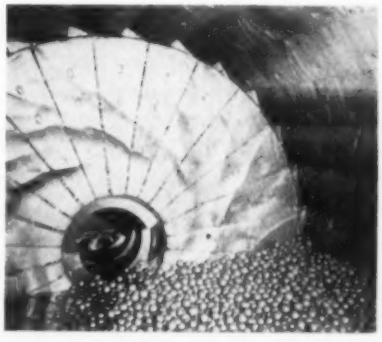
Chrome-Moly Steels Prove Ability To Resist Wear and Abrasion, Cut Costs

Can be Adapted to a Wide Range of Uses

To offset rising equipment and maintenance costs, the savings possible with wear-resistant alloy steels are receiving increasingly wide attention, in a growing number of industries.

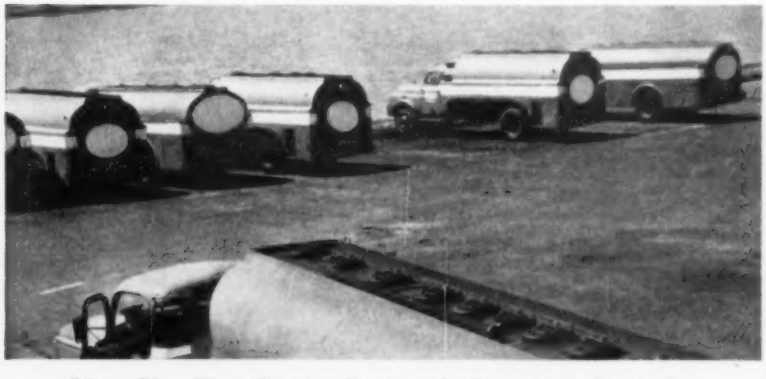
Two types of "Chrome-Moly" steels show exceptional resistance to abrasion and wear under toughest conditions. Both have substantially cut liner costs and shutdown time in grinding mills. Both are suitable for a variety of other industrial applications because they combine wear resistance, favorable first cost, freedom from premature failure by breakage or spalling, resistance to flow in service, consistently uniform performance and adaptability to specific designs.

The two types are Pearlitic (250-450 BHN) and Martensitic (450-700 BHN). Carbon and alloy contents and heat treatments of both types can be varied to suit specific applications.



Note that the spiral wear pattern is clockwise, even though the mill's rotation is counter-clockwise. Type 2 Martensitic steel is used here.

For an article on the use of Chrome-Moly steels, send for "How to Select Chrome-Moly Steels for Ball and Rod Mill Liners" by T. E. Norman, reprinted from Engineering and Mining Journal. Circle #1 on the coupon.



New Use For Super-Strength Structural Steels

Today, gasoline trailer tanks are built of super-strength structural steels for a good reason. The steels have high strength/weight ratios. This factor enables builders to design tanks that carry greater payloads and still meet legal gross weight limits. And the extra capacity pays for the higher trailer cost in a few months!

This use is only one of countless possibilities for utilizing the steels' minimum yield strengths of 55,000 to 150,000 psi . . . and their many other desirable properties. *For more information, including tradenames and compositions, ask for "Super-Strength Structural Steels." Circle #2.*

Sums Up Moly's Resistance to Corrosion

A new paper, "Corrosion Resistance of Molybdenum and Molybdenum-Base Alloys," based on published literature, summarizes moly's resistance to a number of corrosive media. It also lists the reference articles. For a copy of this paper, *circle #6.*

Molybdenum Improves Corrosion Resistance of Stainless Steels

Translated excerpts from two French articles discussing how moly improves the corrosion resistance of austenitic and austenitic-ferritic stainless steels are now available. *Circle #7.*

Special Steels Solve Hydrogen Sulphide Problem

Hydrogen sulphide in France's Lacq natural gas field brought up a metallurgical problem: the need for tubing meeting the N-80 strength requirements but with better resistance to sulphide stress corrosion than the conventional N-80 grade. Two such steels have been developed. One contains chromium, aluminum and molybdenum; the other contains chromium, molybdenum and vanadium.

For articles discussing both steels, send for "A Special N-80 Steel Tubing . . . " by Cauchois, Didier and Herzog, reprinted from *Corrosion*, and "Comments on new French N-80 Steels" published by Climax. *Circle #3.*

Vanadium in Low-Alloy, High-Temperature Steels

Molybdenum is a must in low-alloy, high-temperature steels. However, recent tests at the U.S. Naval Research Laboratory point up the role of Vanadium in such steels, and show the effect of variations in composition and treatment. Addition of Vanadium results in a better high-temperature alloy, but getting the improvement requires higher normalizing temperatures.

The advantages and limitations are described in an *Iron Age article*, "Higher Vanadium Improves Hot Strength of Low Alloy Steel," by Paul Shahinian and J. R. Lane. *For reprints, circle #4.*

New Cleaner Removes Surface Oxides From Moly Metal

A practical, low-temperature method of cleaning molybdenum has recently been developed. It is especially suitable for removing surface oxides prior to welding. The process involves two chemical baths: one at 150-180°F, the other at room temperature. *Digested from "Ryan Devises Molybdenum Cleaner," Ryan Aeronautical Company. For reprints, circle #5.*

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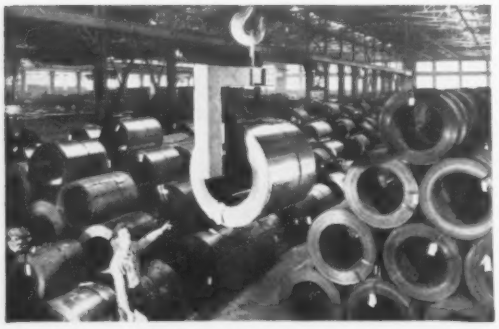
3 important check points on steel suppliers

for the buyer with a management viewpoint

In 1917 Ryerson already had 75 years of steel-service experience

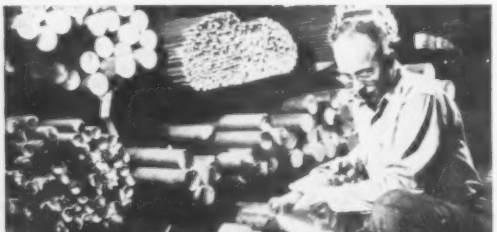
DEPENDABILITY AND EXPERIENCE—Is your company establishing a sound business relationship with a supplier of steel from stock who will be willing and able to furnish steel at fair prices next year or five years from now under all market conditions? And is your company dealing with a supplier who can give you the benefit of experience gained in working with tens of thousands of other companies whose problems of steel purchasing, selection and fabrication may be similar to yours?

The supplier with the broadest experience is Ryerson—the nation's largest steel-service organization with a 115-year record of dependable performance.



A small part of the huge steel stocks at one Ryerson plant

CAPACITY TO SERVE—Consider this recent example: It was 10 after 5 P.M. The phone rang and a steel buyer 80 miles away said: "I've got to have 60,000 lbs. of slit coils first thing in the morning." Impossible? Not at Ryerson. The needed steel was on hand in Ryerson stocks—the nation's largest, by far. Unequalled processing equipment was put to work. And during the night coils of two different gauges were slit to size requirements. Early the next morning the steel was delivered as promised—80 miles away. This kind of service takes great capacity—and Ryerson has it.



Spark testing Ryerson bar stocks to avoid mixed steels

QUALITY OF PRODUCT—Mislabelled steel cannot pass skilled Ryerson inspectors who "read" steel sparks to determine carbon content and alloying elements with amazing accuracy. And spark testing is typical of the exacting attention given to quality control at Ryerson. As a result you are sure of getting the third important requisite of satisfactory steel service—steel of known, uniform high quality, accurate in size, gauge, length and weight, and right for your particular application.

In stock: Carbon, alloy and stainless steel—bars, structurals, plates, sheet and strip, tubing, reinforcing steel—aluminum, industrial plastics, metal-working machinery, etc.

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Plan Nuclear Space Ship

The idea that nuclear power is potentially the best fuel for space vehicles is gaining ground in Washington. Nuclear propulsion means that a space ship could be controlled in flight and carry a human payload. Admiral Hyman Rickover, developer of the atom-powered submarine, may be assigned the job of perfecting a nuclear space vehicle.

No More Scrap Buggies?

Look for radically different scrap charging systems to be installed in openhearth shops. One mill has eliminated its scrap buggies and claims a 30 pct saving in charging time with a new technique. Another firm is testing a vibrating-feed device for scrap charging. The next big push for more steel production will see tests on a variety of new charging systems.

Copper Tools Will Spark

"Non-sparking" copper tools can cause spark-ignited explosions just as easily as steel tools, Navy researchers claim. They claim that metallic sparks can result from contact between non-sparking and sparking metals, and that impact is more dangerous than friction as an ignition source.

Punch Card Painting

A French automobile parts line programs its automatic paint spraying operations on punched cards. The system schedules work far ahead and brings parts to the spraying area on the split second. Engineers say it's a degree of automation that has not yet been achieved in U. S. auto plants.

Cast Around Wrought Iron

A Midwest manufacturer combines wrought and cast iron in a unique way to make hydraulic turbine components. Blade buckets of wrought iron plate are first curved in a forming die. The proper number of buckets is then assembled in a mold and cast iron is poured in. Molten metal flows through holes in the bucket edges. When the cast iron solidifies, the wrought iron buckets are firmly bound to the hub and band casting.

Steel Sales Pick Up

Several straws in the wind point to a pickup in steel orders. Sample: A leading eastern warehouse was happily surprised when it added up December sales figures, found they were more than 10 pct above November results. Similar reports from scattered areas cause producers and warehousers to wonder if the slump is over.

Positive Rake Saw Teeth

Tests show that a forward hook or "positive rake" in band saw tooth design boosts cutting rates and reduces feeding force. The hooked teeth literally pull themselves through the work. Less pressure is needed to keep contact between the work and the saw, which cuts operator fatigue in manual feeding and brings smoother results in machine fed operations.

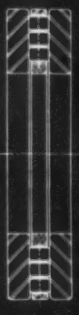
New Electronic Tool

The solion, an electronic device that may replace the transistor at frequencies below 100 cycles per second, is being developed for commercial use. Low power requirements of the extremely sensitive solion make it ideal for remote, unattended electronic devices. Small, lightweight solions could conceivably replace entire circuits now made up of assorted resistors, capacitors, inductances, electron tubes, and transistors.

Better Missile Materials

A bright hope for ever-faster missiles yet to come is a refractory skin which combines metal fibers with heat-resistant oxides. The oxides will gasify at extreme temperatures. It's believed that the Russians have been working along similar lines for some years, but the U. S. appears ready to announce a practical refractory skin. It will probably be prestressed.

MESSINGER *Roller* BEARINGS

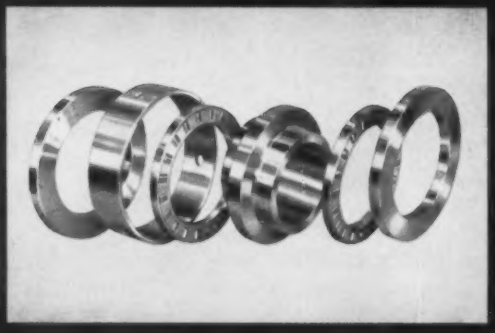


Single Acting THRUST ROLLER BEARING

For installations where heavy thrust loads are applied. May be positioned vertically or horizontally. Will carry 3 to 4 times the thrust load of same size ball bearing. Widely used—for steel mill and paper mill equipment, large cranes and crane hooks, rock crushers, vertical motors, pumps, etc. Sizes: From 3" bore to diameters of 15 feet.

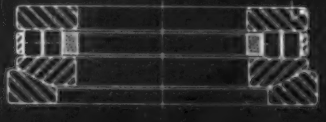
Double Acting THRUST ROLLER BEARING

For installations involving heavy thrust loads in two directions. Used extensively in steel mill, paper mill, and other applications where economy of initial cost and longer service life are important factors. Sizes: From 4" bore to over 50" bore.



Self-Aligning . . . Single Acting THRUST ROLLER BEARING

Used where heavy thrust loading is incurred and provision must be made for misalignment. The self-aligning action of this bearing is accurate and reliable.



Used in dam gates, grinding machines, vertical shaft electric generators and vertical shaft beaters. Sizes: From 4" bore to over 30" bore.

Messinger Roller Bearings are designed to carry heavy loads; to provide long service life with unequalled efficiency and economy; and to fit into the smallest possible space. *Send details of your specific requirements or write for literature.*

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Reversing the Downtrend A Challenge for Tool Builders

New Developments, Marketing, Are Chief Hopes

Total shipments for 1957 were respectable, but new orders indicate a tough time in 1958.

Replacement of old tools by money-saving new models is a major hope to reverse the trend.

Numerical controls is the big factor.—By T. M. Rohan.

▪ Machine tool builders are getting weary looking for signs of an upturn. The business deep freeze is on and the thaw is not yet in sight. It's a condition that's bringing on aggressive countermeasures.

Many tool builders are rolling up their sleeves and going to work making technical improvements in their products, developing new markets and marketing methods, seeking diversification, subcontracting, and training personnel. They are bringing some big guns to bear on a prime target—faster amortization of machine tools.

Orders Fall Off—Saleswise, the industry continued to lose ground rapidly in the fourth quarter of 1957. Total shipments last year were about $830 million, according to preliminary figures of the National Machine Tool Builders Assn.

If incoming orders continue at the rate they dropped in the fourth quarter, shipments for 1958 may tumble to about $400 million. This is an industry which in 1953 shipped over $1 billion, with capacity expanded since then.

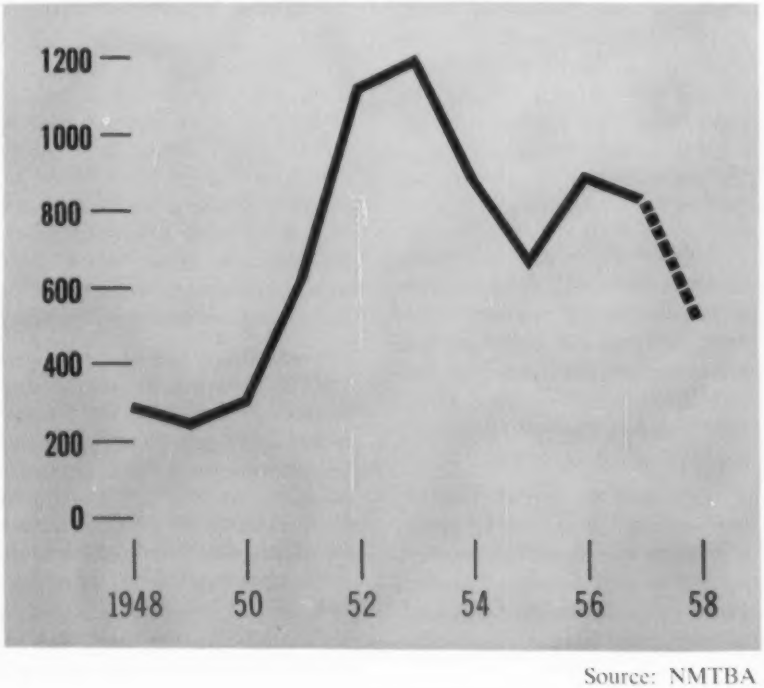
Rivalry From Abroad—An additional thorn in the side is low-priced imports. In 1955 imports of cutting-type machine tools were $12 million. In 1956 they jumped to $19 million. And in the first 7 months of 1957 they were already up to $17 million. The imports for the first 7 months of 1957 represent 3.3 pct of the market compared to 1.9 pct in 1955.

On the domestic market, automotive is expected to lag for another year. Government stockpiling and continued surplus sales rule government out as a promising market. The aircraft-to-missile trend eliminates many complex machining jobs in favor of tubular shapes.

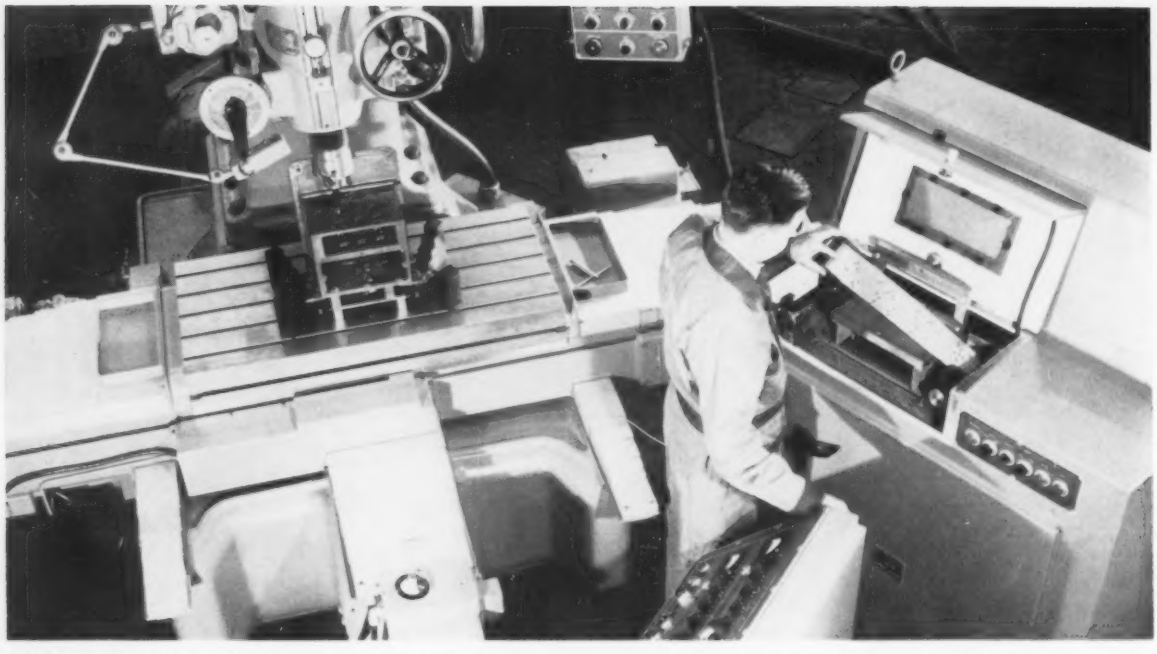
Few Money Problems — Financially, the U. S. producers' position is strong. Among publicly held companies, for example, Monarch Machine Tool Co. has paid dividends each year since 1913; Cincinnati Milling since 1923; Foote-Burt since 1929; Brown &

Shipments of Machine Tools

Millions of Dollars (Metal Cutting Types Only)



Source: NMTBA



GROWING MARKET: One of the brighter spots in the machine tool market is a trend toward numerical controls for smaller machines, like this tape-controlled jig borer produced by Pratt & Whitney.

Sharpe since 1934, and Farrel-Birmingham, National Acme, New Britain, Gisholt and Jones and Lamson since 1936. Labor troubles have interrupted several others with long healthy records.

For the immediate future the industry is concentrating on several major fronts, principally: Replacement market, numerical controls for smaller machine tools, realistic tax depreciation, diversification and sub-contracting, increased marketing and sales efforts, and personnel training and upgrading.

Builders' Plans — "Undoubtedly the most promising broad single development for our industry in the next few years will be the replacement market and numerical controls for smaller machine tools," says Ludlow King, NMTBA executive vice president.

"Because there are so many old machines still in use, our industry will push new machine tools as production cost cutters. The hard part is to pry loose additional capital investment during sluggish operations.

The Immediate Market — "Numerical controls for smaller machines will open up a top market," Mr. King continues. "Techniques have been developed based on shop practice on larger machines. The need for greater production during the Korean War helped push the trend.

"With the high cost of the controls, the most immediate market in the field is in hole grinders, jig borers, rotary tables, and similar jobs where about 25 or more repeat lots can be accumulated. Systems have been developed mostly for new tools. Older ones are hard to adapt because of higher precision and speed requirements."

Trend Gains Speed—At a recent NMTBA numerical control conference in Cleveland, 12 builders reported they are already equipping smaller machines with numerical controls. At least 20 more firms are working on the idea. Conference attendance was 73 compared to 40 at the same type meeting 18 months ago.

"We have registered as high as 40 to 50 pct increased output with some of our new numerically-controlled machines," says James Allen, sales manager of Pratt & Whitney Co., Inc.

First-Run Saving — "Jobs normally taking 6-8 hours have been done in as little as 2½ hours," explains Mr. Allen. "In addition there's the intangible value of less strain on the operator and less stopping to check and re-check. Once correctly set up, succeeding jobs have a hard time missing. On most, a significant saving is made on the first job run."

On a new Keller machine coming out in September the control runs about $60,000. And on smaller units like jig borers it will add $20,000 to the cost of a $40,000 unit. It indicates that development of a cheaper electronic control has lush possibilities.

Wanted: Tax Relief—Faster tax depreciation schedules on machines are also a prime target for the industry. If faster write-offs could be obtained on new machines, builders feel their business would spurt and the government's revenue

would show a net increase from the new business generated.

Mr. King terms present 20-25 year normal depreciations as "archaic." His group is shooting for a standardized 7-10 year writeoff. Designs have been so improved in recent years that machines become obsolete in 7-10 years, he points out. One builder has coined the slogan: "The man who needs a new machine tool is already paying for it."

U. S. Is Notified—NMTBA past President Jerome A. Raterman has formally proposed a faster writeoff in an August, 1957 letter to the U. S. Dept. of Internal Revenue based on a 1956 survey by the association. It is comparable to similar recommendations for depreciation of machine tools made by the auto and aircraft industries.

It recommends revisions to Bulletin F on tax depreciation policy and practices holding that the present schedule is based on statistics and experience of the 1930's and 40s. The schedule was temporarily suspended in 1940 and 1950 to accelerate defense facilities.

Urge to Diversify—To keep their shops operating many machine tool makers are opening the doors on diversification.

"We are open to any reasonable proposition in the way of buying a company and we are looking at everything that comes up," one spokesman says. Cincinnati Milling Machine Co., for instance, has also been in grinding wheels, cutting fluids, metal spinning and hydraulic pressure-forming for some years. In past years it took on boxmaking machinery.

Warner & Swasey of Cleveland in 1945 took over manufacture of a specialized power shovel, the Gradall, which now represents 25 pct of the business. A textile machinery business was taken over.

Subcontracting Outlet — Norton Co. of Worcester, Mass., is actively soliciting specialized precision job lapping contracts and has for years undertaken subcontract work in the community, according to E. M. Hicks, vice president and general manager.

Subcontracts will amount to 4-5 pct of company business this year compared to a normal 2 pct, according to Mr. Hicks. And company salesmen are being trained to discuss precision subcontracting with customers.

Hard Selling Continues — All companies, of course, are straining to get their share of what business is available. The replacement market will get the lion's share of the effort with hard-hitting presentations on sales. Most salesmen feel that cutbacks in expansion plans by their customers are more postponements than cancellations.

National Acme in Cleveland, like others, is bolstering salesmen with new comprehensive literature and case history material besides a step-up in existing sales techniques.

On an industry plane, the NMTBA is producing a 20 minute movie, "One Hoe for Makwanga," for industry institutional use. Makwanga, incidentally, is a South African town in which a hoe maker turns out one hoe per day. This is contrasted with U. S. farm equipment production.

Education Safeguards—Training of apprentices, salesmen, and engineers is by no means new, of course, but it's getting increased attention. Cincinnati Milling has had a cooperative engineering program for college students since 1906 with the University of Cincinnati. They now have up to 40 different types of programs, many running to 8000 hours.

They include business administration and other non-engineering trainees besides one of the most thorough apprentice training programs in the industry. Biggest current need is for more broadly trained technicians in electronics, hydraulics, and mechanical work.

Engineering graduate recruiting is still going on actively, despite one-shift plant operations.

Hourly Pay Rate Goes Up 7¢

▪ A healthy segment of U. S. industrial workers will get 7¢ per hr increases this year with no struggle at all.

About 30 pct of contracts analyzed in a recent survey by the National Industrial Conference Board provided for the increase automatically this year. For last year the median increase in the 430 settlements studied was slightly over 10¢ per hr with more than half ranging between 7¢ and 12¢.

Coffee Break Cost—A comparable survey just completed by Associated Industries of Cleveland indicated increases there last year came to 7.34¢ per hr excluding fringe benefits for 138,211 workers in the 318 agreements studied.

In addition the multi-million-dollar institution of the coffee break is costing Cleveland employers about $3.82 a week per employee for two 10 min breaks and $5.72 for two 15 min breaks.

Tightening Up—On the bosses' side of the fence, Associated Industries pointed out that one metalworking company has increased its output by 8/10 of 1 pct (0.08 pct) per year by gradual tightening of standards which were permitting wastage of 1/5 of each working hour.

In its wage increase survey in Cleveland, Associated Industries found that among 318 agreements analyzed, the weighted average increase last year was $.0734 excluding fringes. The range was from no increase to 22.5 cents. Among larger groups, 27 companies settled for 5 cents, 54 for 6 cents and 27 for 8 cents. In two group negotiations, 52 companies gave 10 cents and 37 companies 22.5 cents.

Total Picture — Nationally, the recent NICB survey showed 430 settlements last year provided wage increases between 7¢ and 12¢ per hr and a median increase of slightly over 10¢. Few were for less than 5¢ or more than 15¢.

UAW Gets Ready for Next June

Convention Approves Reuther's Bargaining Plan

Short work week demand is laid aside—for now. Profit-sharing is the new gospel.

Aircraft workers will include severance pay in their new demands.—By H. R. Neal.

▪ The United Automobile Workers' once prominent short work week demand is still alive, but just clinging.

Delegates to the special UAW convention in Detroit last week had expected a strong drive to revive and reinstate the four-day work week demand. It never got off the ground.

Reuther in Control—UAW President Walter P. Reuther once again left no doubt as to who runs the giant union. Confident of his strength, he put on a show of democracy at work in the UAW with a long debate among the delegates over dropping the short week in favor of Mr. Reuther's new, controversial profit-sharing plan.

Led by Carl Stellato, president of the giant, 50,000-member Ford Local 600, the opposition never got a roll-call vote, even after a debate that took up part of two days.

Short Week Not Dead — The UAW leader said the short week is "not precluded" from 1958 negotiations and it will be kept alive through demands for joint committees to study automation and technological advances. However, the four-day week has definitely been laid aside for a better time.

Short Week Support — In last week's debate, Stellato was backed by a number of other local leaders and delegates. They were principally from Chrysler plants in Detroit, General Motors plants in Flint, American Motors plants in Wisconsin, and the Studebaker-Packard plant in South Bend.

At the conclusion of the debate, which was conducted with meticulous non-favoritism, Mr. Stellato called for a roll call vote. He was unable to muster the 800 show of hands needed to get it.

How It Works—These "supplementary demands" call for a 25 pct share of profits above 10 pct of the gross profits to be split among salaried and hourly workers covered by UAW contracts, as the employees decide. They further suggest another 25 pct be returned to buyers as a rebate on cars bought during the year. The remaining 50 pct would be reserved for stockholders and bonus-plan executives.

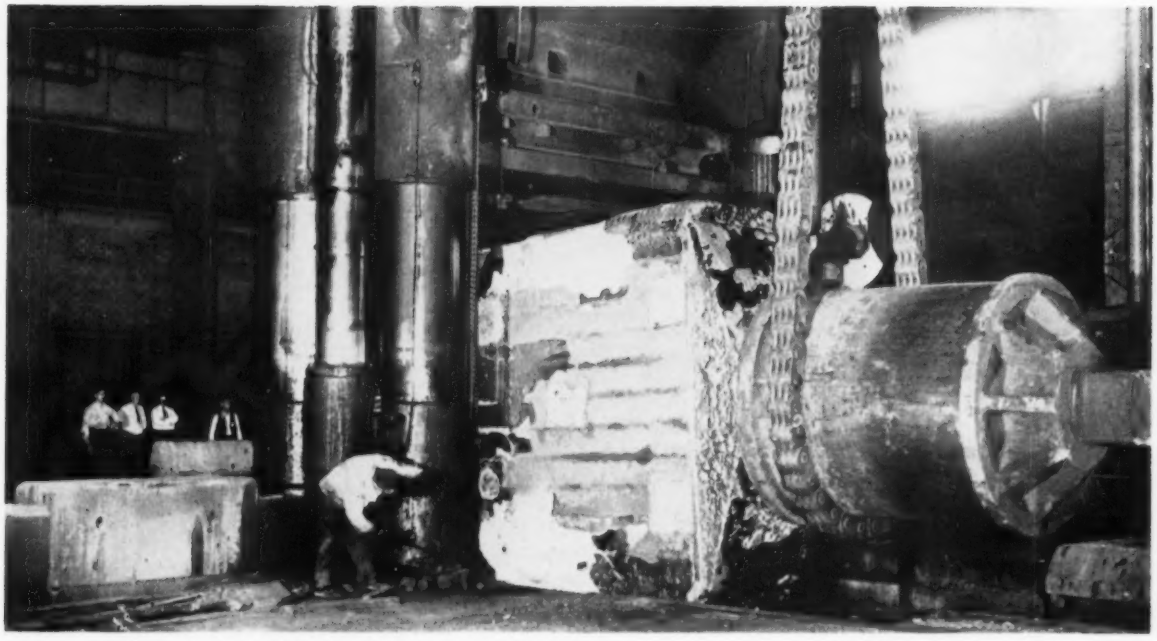
"Minimum demands" are orthodox, calling for increasing contract provisions.

Severance Pay for Aircraft—A special nod was given aircraft workers, whose bargaining demands were also approved. While calling for a "substantial" wage increase, the principal feature is demand for severance pay.

Leonard Woodcock, UAW vice president, said the feast or famine nature of the aircraft industry makes severance pay mandatory. The union seeks a half day pay for each month of service.

Milestones in UAW's Short History

1936	**Swings to CIO. Stages first sitdown strike.**
1937	**Sitdown strikes at GM and Chrysler win recognition. Battle of overpass at Ford. Ford holds out.**
1940	**Vacation pay won from GM.**
1941	**Ford surrenders, grants union first contract. Established union shop, grievance procedures and checkoff dues paying.**
1946	**GM strike leader Walter Reuther elected president of UAW.**
1947	**Union gains six paid holidays from GM.**
1948	**UAW gains annual improvement factor and escalator clause. Workers' annual pay increases geared to technological advances, additional compensation based on cost-of-living.**
1949	**Ford grants pensions to workers.**
1950	**Chrysler and GM grant pensions.**
1955	**Union wins supplemental unemployment benefits at Ford. Others follow suit.**
1958	**?**



PUTTING ON THE SQUEEZE: Future cyclotron part starts out as ingot in 7000-ton forging press at U. S. Steel

Big Forge Plants Sidestep Slump

There's been no lag, and none is expected, in the demand for large steel forgings.

Main market is power shafts for electric utilities. And atomic reactor field looks promising.—By G. J. McManus.

▪ One tight little industrial island stands untouched by the current industrial skid.

Makers of the heaviest steel forgings for electrical power generation felt no lag in 1957. They are booked solidly for this year and they see sales holding at a high level at least through 1960.

The Big Four—This prosperity is measured in concentrated lumps. Only four plants can forge the big shafts for steam and hydroelectric generators. Only six customers buy these large forgings. Only a few hundred individual orders cover total business now on the books.

At first glance, this all seems like a narrow activity. It isn't. The whole power-based U. S. economy depends ultimately on the four big forge shops to keep the wheels turning. Power utilities are adding about 11 million kw a year in generating equipment. (See The IRON AGE, January 9, p. 27.) Most of this will be built around forged shafts that weigh from 15 to 75 tons each.

Three Large, One Medium—United States Steel, Bethlehem Steel and Midvale-Heppenstall Company are the big three in the large sizes. All have presses rated at 7500 tons minimum capacity and can produce ingots exceeding 250 tons. Erie Forge and Steel covers the medium range up to about a 95,000 lb. forging.

From a dollar standpoint, a single electrical forging is big business. Press forgings range in price from about 12¢ a pound to $1.50 a pound. Average is around 30¢ a pound but heavy electric forgings are on the top side of the scale. An individual power shaft can easily cost $80,000.

Atomic Future—Expansion activity by forgers is aimed mainly at the electrical utility field. Elsewhere, press forgers find business spotty. There is still a good demand for marine propulsion shafts. Atomic reactors offer a promising market, both in power generation and marine propulsion applications. Forgings are going into reactor top sections, where entry ports are cut and extra strength is needed. Where a forging will come in contact with radioactive material, it is clad with stainless by deposition welding.

Demand for steel mill rolls and general machinery forgings is off.

Sales of rolls to aluminum mills have been holding up well but the completion of expansion projects is expected to bring a slowdown in this field. Replacement liners for aluminum extrusion presses have provided a respectable forging market.

Scrap Industry Seeks Stability

"Bankability" of Scrap May Be a Solution

Retiring Scrap Institute president seeks to establish acceptance of scrap as basis for bank loans.

Industry concern grows over the violent ups and downs of the market.—By J. B. Delaney.

▪ Will the iron and steel scrap industry ever achieve the stability many of its leaders and elder statesmen would like to see?

MYRON L. CHASE: President, Institute of Scrap Iron & Steel.

This was one of the questions most asked by the nearly 1000 delegates to the 30th annual convention of the Institute of Scrap Iron & Steel at Miami Beach, Fla., last week.

Worrisome Overtones — The question is one that has to do mainly with markets and prices. But there are public and customer relations overtones that are worrisome.

Leonard H. Krieger, retiring president of the Institute, puts it this way:

"The spectacular vicissitudes of the scrap market have tagged it . . . as a wildly speculative commodity. This is doubly distressing in light of the fact that scrap iron should be a sound and relatively stable material. It is the number one basic commodity in steel manufacture."

Scrap Bankability—Mr. Krieger's solution to the problem is a program to increase the "bankability of scrap"—that is the acceptance of scrap as collateral for loans from banks and government agencies. He feels this would not only stabilize the market and prices, but would help scrap dealers, particularly smaller firms, over the rough spots. Usually, banks will lend money on scrap inventory only if the dealer has a firm order from a mill.

At the same time he warned that steel mills and other scrap users want and have a right to expect a good supply of scrap at relatively stable prices. It does no good, he said, to try to pass the buck for the sharp swings in the scrap market.

Mr. Krieger's five-point program to increase the "bankability" of scrap and thus enable dealers to stock up on scrap in a slow market would:

1. Educate private bankers in the value of scrap and its use in steel mill and foundry operations. Mills would be asked to help.

2. Continue the Institute's program of quality improvement and maintenance and the research programs designed to assist in this direction. Set up standards of procedure for scrap preparation.

3. Solicit steel mill cooperation. Ask the mills if they can forecast the usage of scrap iron under specific business conditions so that this information might be available to banking interests.

4. Seek government assistance. Since scrap is recognized in every national emergency as a vital natural resource . . . representations should be made to the proper government agencies to the end that reasonable loans could be made against stocks.

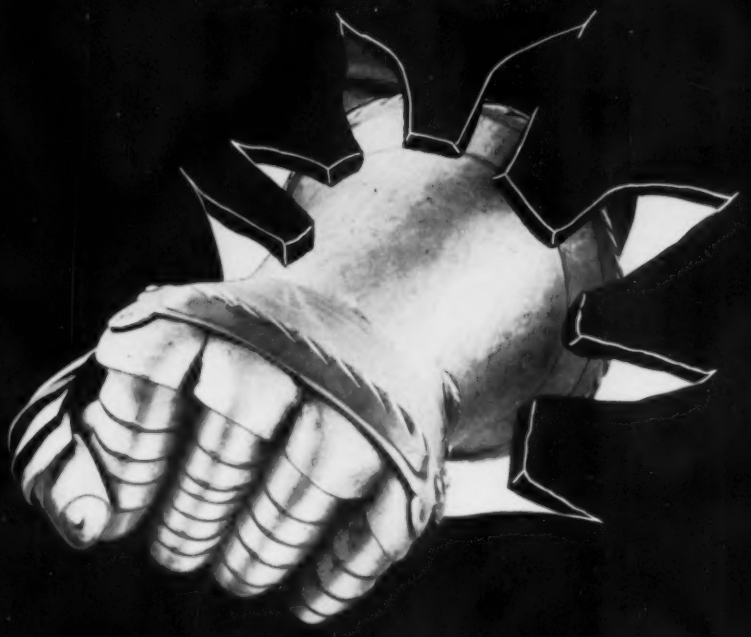
5. Use the Institute of Scrap Iron & Steel as a vehicle to lend validity to this program.

Myron L. Chase was elected Institute president for the coming year. Milton Mahler was named first vice president; E. J. Moskowitz, second vice president; Harry Marley, treasurer; Ralph Kopelove, secretary; Edwin C. Barringer, executive vice president, and Samuel G. Keywell, treasurer emeritus.

MILTON K. MAHLER: Elected first vice president.

IRON CURTAIN SMASHED!

"NEWS ITEM NO. 1 — 1958"



The Bound Brook Oil-Less Bearing Company has proudly smashed through the iron curtain of skepticism surrounding the use of sintered iron bearings. Although Bound Brook's POWDIRON has long been hemmed in by indifference and predjudice, this LOW-COST, tough performer has higher strength than bronze, excellent finish, and bearing characteristics adequate for many applications. Find out how POWDIRON can smash your bearing costs and strength problems to-day.

BOUND BROOK

BOUND BROOK OIL-LESS BEARING CO., EST. 1883, BOUND BROOK, N. J.

Pioneer in

POWDER METALLURGY BEARINGS + PARTS

our 75TH year

A Motor Every 12 Minutes

Magnetized belts carry rotor and stator blanks for 40 to 125 hp motors at General Electric's new, highly mechanized plant at Schenectady.

Blanks are punched from 5-ton coils of steel on the punch press, at left, and ejected automatically to the belts. These run below the floor, vertically and overhead to the next station.

The new facility cost GE $7.5 million, features tape controls, and other automatic devices and concepts. It can turn out a 40 to 125 hp motor every 12 minutes.

The project was specially designed to make special motors. Bryce W. Wyman, general manager, GE's small ac motor and generator dept., points out that only one-third of the 40 to 125 hp motors are standard.

The company made the investment to be ready for a 30 pct increase in sales of electric motors and generators expected by 1961.

Asarco Starts Up Arc Furnace for Copper

American Smelting and Refining Co. has thrown the switch on a new copper melting electric furnace at its Perth Amboy, N. J. plant.

While this is the seventh copper refinery to use arc melting, it is probably the first attempt to operate an arc furnace more economically than conventional reverberatory furnaces in an expensive power area.

Asarco says its new furnace and auxiliaries has a lower capital cost, on a yearly production basis, than multiple reverberatory installation and auxiliaries.

Faster—The furnace is 18 ft in diam, with a bath capacity of 90 tons.

Asarco says it is the world's largest copper melting electric furnace, electrically as well as physically, with a transformer rated at 8000 kva. It is also reputed to be the largest hydraulically-controlled direct arc furnace in the U. S.

Sharon Expansion Plans

More production facilities and greater diversification of products is a primary aim of Sharon Steel Co., says James A. Roemer, board chairman.

As evidence, Mr. Roemer referred to a $6 million electric furnace now being installed to double stainless steel capacity, and a $14 million rolling mill that was installed last year. Sharon market and metallurgical research is aiming for new and better alloys.

Fairless Honored

The nation's business and industrial publishers this week conferred their highest award upon Benjamin F. Fairless, president, American Iron and Steel Institute.

Mr. Fairless, in accepting the annual "Silver Quill" award of the National Business Publications in Washington, D. C., criticized wage rises that are not related to gains in productivity. Such wage rises are clearly inflationary, he warned, and contribute directly to the loss of consumer purchasing power in recent years.

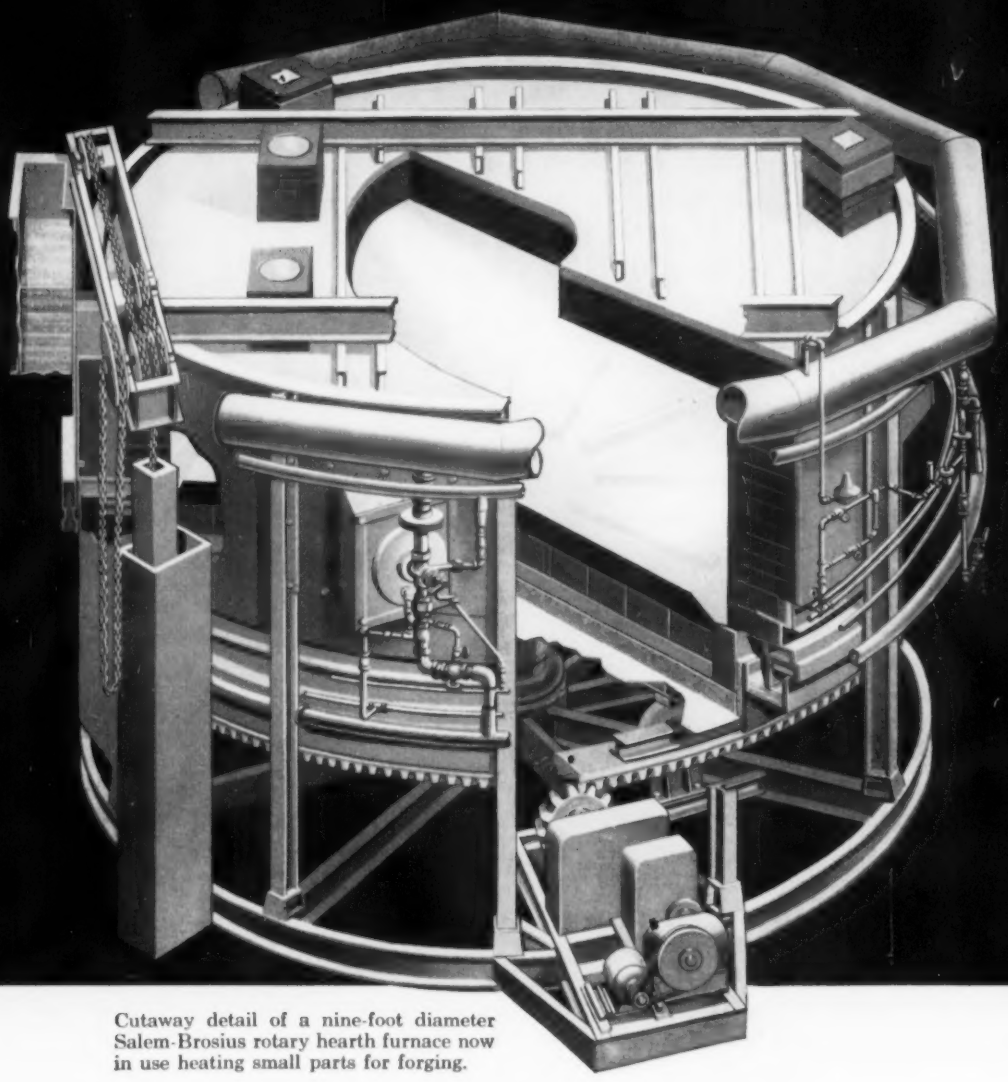
Industrial productivity has gained by 26 pct in the past 10 years, Mr. Fairless told the publishers, whereas wages have gone up by 61 pct. The difference spells inflation, he pointed out, and called upon employers to maintain parity between productivity gains and wage rises in order to "starve" the germs of further inflation.

Mr. Fairless received the award from Vice President Nixon. The "Silver Quill" is awarded annually to the businessman or industrialist who has contributed signally to the U. S. economy during the year.

Blast Furnace High

U. S. blast furnaces turned out a record amount of pig iron and ferroalloys in 1957, says the American Iron and Steel Institute.

The output of 79,339,671 tons topped the former high, in 1955, by over 1.5 million tons.



Cutaway detail of a nine-foot diameter Salem-Brosius rotary hearth furnace now in use heating small parts for forging.

This Salem-Brosius rotary furnace in your forge shop saves you money

Companies producing parts for aircraft, automobiles, farm machinery, home appliances and a host of other products find the most economical and efficient furnace they can use to heat parts for production forging is the rotary type shown here. Burners are tangentially placed, and the heat is accurately controlled and uniformly distributed throughout the furnace chamber. The speed of rotation may be varied and is precisely set to the need of the product.

There is no practical forge heating method known that can equal the high production, low maintenance, low fuel cost, and uniformity of product heating of these specially designed rotary hearths. Salem-Brosius has designed and built more rotary hearth furnaces than any other company in the world. Write to us for further information.

SALEM-BROSIUS, INC.

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SPECIAL MECHANICAL EQUIPMENT • INDUSTRIAL HEATING FURNACES • MATERIALS HANDLING EQUIPMENT

SAFETY SWITCHES STAND UP UNDER 100,000 AMPERE SHORT CIRCUIT TEST!

INDEPENDENT TESTING LAB RELEASES FINDINGS AFTER GRUELLING "TORTURE RACK" TESTS

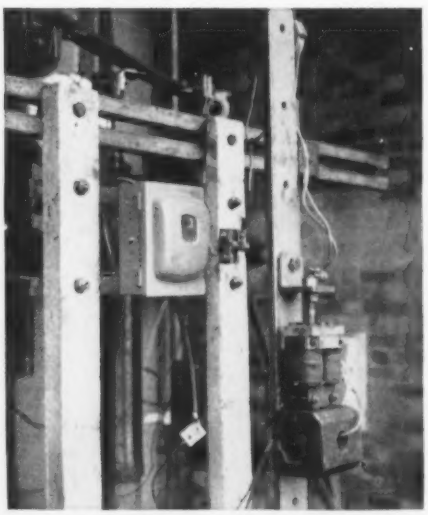
Unprecedented tests have been completed on 30 through 600 ampere rated Square D safety switches equipped with high capacity current limiting fuses. During these tests, switches were closed on a short circuit system delivering up to 100,000 amperes (symmetrical—R.M.S.). In addition, the fault was applied on the closed switches. *All switches withstood the shocks without any sign of failure!*

High Capacity Systems Demand Stamina

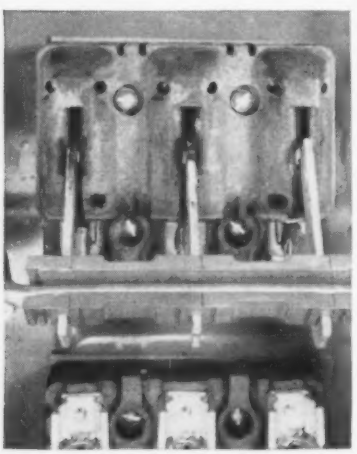
High capacity systems capable of delivering tremendous short circuits are becoming more and more prevalent with the growth of electrical loads. Network systems in metropolitan areas are a source of such faults. Another, the heavy industrial areas, with a concentration of sub-stations and rotating machinery. Terrific stresses and heat generated by such faults are serious hazards to both personnel and equipment unless properly contained. That is why proven protection for switching service and feeder circuits is of major concern.

Square D Standard Switches Do The Job

These tests offer conclusive proof that standard Square D Type HD and Type ND switches, equipped with high capacity current limiting fuses, can be used on such systems without fear of failure. You pay no premium for the proven performance they offer. Why settle for less?



Square D switch on "torture rack" during test involving up to 100,000 ampere short circuit



SUMMARY TABLE • Extract from Report No. 5/NA R66—Sheet No. 5

Ampere Rating	Voltage Rating	Catalog Number	Average Symmetrical Prospective Current R.M.S.	Recovery Voltage R.M.S.	Maximum Total Arcing Time	Fuse Type
30	250	A85351	96,600	252	.0009	A2Y-30A
30	250	A85351	96,400	253	.0010	FRN-30A
30	600	A85341	107,000	590	.0020	A6Y-30A
30	600	A85341	106,000	601	.0027	FRS-30A
60	250	A86352	96,400	248	.0010	A2Y-60A
60	250	A86352	95,200	252	.0019	FRN-60A
60	600	A86342	106,000	605	.0011	A6Y-60A
60	600	A86342	108,000	598	.0020	FRS-60A
60	600	A86342	107,000	601	.0013	NAS-60A
100	250	A86353	95,200	253	.0009	A2Y-100A
100	600	A86343	108,000	604	.0014	A6Y-100A
200	250	A86354	95,200	253	.0037	A2Y-200A
200	600	A86344	107,000	602	.0011	A6Y-200A
400	250	A86355	95,900	252	.0039	A2Y-400A
400	600	A86345	106,000	611	.0050	A6Y-400A
600	250	A86356	94,500	251	.0062	A2Y-600A
600	600	A86346	107,000	601	.0062	A6Y-600A

Above • Extract of Nelson High Power Laboratory Report C/NA-66

At left • No sign of failure in this switch interior after 100,000 ampere short circuit test

SQUARE D SAFETY SWITCHES GIVE YOU *Certified* PERFORMANCE!

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

James F. Clark

Heads-Up Diversifying Pays Off

There are many advantages to diversification, says Mr. Clark, if you go about it the right way.

One of them is as an offsetting factor when the business cycle starts down.

JAMES F. CLARK: Diversify for profits, not for glamor.

▪ Whenever work is found for an idle man or machine, every element in the country benefits, says James F. Clark, president, ACF Industries, Inc. and an advocate of "intelligent diversification."

Diversification can mean "more jobs, more plentiful commodities and services, more scientifically run businesses as well as higher company profits and dividends."

Basis for Success—Since he was elected president of ACF in 1954, Mr. Clark has been plugging away at the extreme cyclical swings in the company's original market—railroad car building. With a financiers perceptive regard for the balance sheet, he has helped steer ACF into a course of "intelligent diversification," which he defines as a plan where "related experience and skills provide a basis for success in a new area of operation."

His plan is working. In 1957, he led ACF through one of the outstanding years in its history. Net earnings were over $9.8 million.

Through acquisitions and expansion, the company's product list now includes such items as fuel injection systems, airborne search-and-point equipment, a high-speed electronic weighing system, missile components, oil well instruments, valves and fittings, and nuclear energy products.

New England Background — A native of North Attleboro, Mass., Mr. Clark sharpened his financial teeth at Yale University where he was graduated in 1925. After a try at the manufacturing jewelry business, he joined Hemphill, Noyes and Co., New York, specializing in corporate finance.

During World War II, he served with the Foreign Funds Control of the Treasury Department, later with the Rubber Bureau, War Production Board, as director.

When he came to ACF in 1948, he rose through the upper management echelon swiftly. He was elected successively treasurer, vice president, member of the board, and finally, president.

Profits, Not Glamor—An example of how Mr. Clark thinks is his explanation of the company's venture into the nuclear products field: "We conduct our operations at a profit and we have made no effort to buy glamor to the detriment of our profits-and-loss figures.

"Of course," he continues, "there is no business that is free from business cycles . . . It is as against a measured exposure to these cycles that we are designing our program of diversification, with the objective that the peaks and valleys inherent in any of our varied fields will not be coincident."

It's the kind of thinking that got him into the top swivel chair at ACF.

How 689 Mills Cut Bearing Cost Per Ton Of Steel Rolled

By mounting roll necks on Timken® tapered roller bearings, a rapidly increasing number of steel mills keep production high, downtime low, and hold bearing cost per ton of steel rolled at rock bottom. Here's why:

1. **LONGER BEARING LIFE.** Tonnage records from hundreds of mills demonstrate that the long life of Timken bearings on mill roll necks holds bearing cost per ton of steel rolled, to a minimum.

2. **BETTER MILL RIGIDITY.** Timken roll neck bearings have a unique balanced proportion design that lets you use larger roll necks than ever before possible with tapered roller bearings.

3. **SIMPLIFIED LUBRICATION.** You don't need complicated lubricating systems when you use Timken roll neck bearings. They permit use of simpler, less expensive grease lubrication.

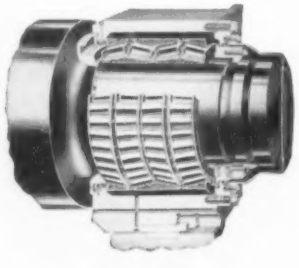
4. **HIGHER LOAD RATINGS.** Balanced proportion design provides up to 40% greater bearing capacity than previous designs for a given mill roll size.

5. **SPECIAL THRUST BEARINGS ELIMINATED.** Because Timken bearings are designed to take *both* radial and thrust loads, they save you the extra cost of special thrust bearings.

6. **STEEL LOSS ENDED IN MILL STOPS AND STARTS.** With mill roll necks mounted on Timken tapered roller bearings, you can start your mills under full load—and end unnecessary loss of steel.

7. **FASTER MILL ROLLING SPEEDS.** Because Timken bearings are designed with true rolling motion and practically eliminate friction, your mills can roll at higher speeds than otherwise possible.

You can get all these advantages in existing or new equipment when you specify Timken tapered roller bearings for your back-up and work rolls. Get complete details from our specialists. Just call or write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

Small Aid for Small Business

Small business has lots of friends at election time and the opening of Congress.

But emphasis on defense and a big budget may make the small businessman feel like the forgotten man.

■ Once again, politicians of all rank and party are falling all over themselves to get on the record as a friend of small business.

But when the shouting of the current congressional session is over, the small businessman is apt to pick himself up from the floor again, muttering, "What happened?"

Democrats' Baby—The shouting has become all the more vigorous since the Democrats have adopted the small businessman as their baby, although without consent in a majority of cases.

Bills introduced to Congress generally agree on four points. Best hope for the small businessman is a bill with some of these more or less non-controversial measures:

1. Depreciation of used machinery by the same formula as now used for new equipment.

2. Option of paying estate taxes over a period of up to 10 years where the estate consists largely of investments in closely-held businesses.

3. Permission for original investors in small businesses to take stock losses up to a specified minimum on income tax returns.

4. Permission to tax corporations with 10 or fewer stockholders as if they were partnerships.

Tax Possibilities—A number of bills have also been introduced to provide tax relief. One bill, which Congress has seen before, asks the rate on corporation profits to be reduced from 30 to 20 pct on the first $25,000.

Another provides for a graduated or progressive tax rate, with the rate starting at 5 pct on the first $5,000 of net corporate income and increasing in seven graduated stages, with a top rate of 52 pct on all net income over $100,000.

Research Aid — But these tax measures are most unlikely. With the spotlight on a record defense budget, this is not the political climate for tax cuts for any group.

Another bill is aimed at helping small business get government aid on research and development, primarily through directing the Small Business Administration to assist small business in obtaining government contracts for R & D. Other aid from the SBA is also included in bill.

Metalworking Hard Hit

Ten Pct Drop—Industrial production, as measured by the Federal Reserve Board index, has dropped off about 10 pct from a year ago. Most of the drop has occurred in the past several months, a sudden decline that has hit business with a demoralizing thump.

Unfortunately for metalworking, it has suffered from the business recession more seriously than have other elements. Those less concerned with the manufacture of manufacturers' goods and major durable goods have not been as hard hit.

Extent of Decline — Using the FRB's business indexes, it's possible to show the extent that metalworking has dropped. Remember, too, that the latest figures are for December. With the business slide continuing at least through January, these indications are conservative.

Durable manufacturers have dropped off 11 pct compared with a moderate 2 pct decline in nondurables. Consumer durables are down a full 12 pct, with major consumer durables accounting for most of the decline.

Autos Lead Drop—Automotive, by far the largest and most significant category within the consumer durables group, declined 16 pct in 1957. And when January is totaled, the drop will be much more significant.

One conclusion to be drawn from this is that the auto industry still retains a dominant role in overall metalworking industries. It's true that the tremendous boom of 1956 and early '57 took place without an accompanying upsurge in auto production. But, it's equally true that the auto industry has led the decline.

Metals Hard Hit — Primary metals, compound victim of inventory cutbacks as well as production cutbacks among its users, is off much more than any of its consuming groups. Primary metals as a whole are off 23 pct, but the FRB concedes the steel industry itself is off 40 pct, a figure borne out by the industry's operating rate.

Other indications: Freightcar loadings, down 17 pct; manufacturing employment, down 10 pct; machinery production, down 11 pct.

They guard our cities through electronics

One of the vital links in our civil-defense chain is SAGE—Semi-Automatic Ground Environment. This complex system combines all the advantages of radar and electronic computers . . . detects and identifies hostile aircraft, dispatches missiles and fighter planes to destroy them before they come within striking distance.

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How To Rate Executives

Executive mistakes are a luxury few companies can afford. One of the best preventive measures is a sound system for rating executive performance. Yet many firms have difficulty in finding a method that works.

The smooth functioning of an executive rating program can be as important to a company as a technological advance. In setting up executive performance programs, John A. Patton Management Engineers, Inc., has had a close up look at the executive strata of hundreds of companies.

Based on these experiences, this special survey report tells of the approach companies should take to executive rating programs. Also included is a report on the executive appraisal programs of over 400 companies.

COVER PHOTO: Author Harry Clayton, far left, discusses aspects of executive rating program at Motorola, Inc., Chicago with, left to right, Warren Gieffers, Works Mgr., Consumer Div., Walter Scott, Vice President—Manufacturing and Charles Nemic, Plant Mgr.

Take A Realistic Approach to

No matter how good the method, executive rating programs are doomed to failure if not tied in with company goals.

Poor communications are another danger to making a rating system effective.

For overall success, executive appraisal must be preceded by sound selection and development.—By Harry B. Clayton.

▪ The most common complaint heard at executive seminars and clinics throughout the country is simply: "No one will tell me where I stand!"

Many companies have tried to provide a rating system for their managers, only to discover they are unworkable. For one thing, any performance appraisal program automatically meets with resistance by the very people who must administer it.

No man, however callous, relishes the idea of a face-to-face appraisal of a subordinate. Why? Because a man's work is too much an integral part of his total worth as a man. And superiors feel that when they are forced to make a negative appraisal, they are judging the man and his personality, as well as his work.

Need Sound Program—Business is sorely in need of a sound method for determining salary increases, promotions, transfers and development programs. But it is hard put to find a satisfactory means of measuring who should get them.

Faced with failure with canned programs, many companies have turned to rigid, standardized, operating procedures. But, these too, merely serve to enforce a condition which does not have acceptance and is probably essentially unrealistic.

The time is way overdue for many companies to take a long, hard look at their executive rating programs and to install a system based on experience rather than theory.

COMPANY GOALS

Management must approach performance measure from a total viewpoint. Short and long term goals should be mapped out before the technique of executive measurement is applied. Unless there are specific organization goals, that in turn can be refined down to departmental objectives, activities around performance standards will be worthless.

For example, unless a company has a very specific objective in connection with its volume of business, specific performance on sales or production cannot very well be expected. Unless an organization has set up some objectives in the way of new products, it would be difficult to develop any worthwhile objective for the engineering department. The setting of these corporate goals becomes a foundation, then, for successful executive performance standards.

COMMUNICATION

Probably the most important bridge to performance measurement is communication. Here is where most programs bog down. Executives and their superiors simply have difficulty understanding each other.

▪ Success of any rating program lies in a thorough understanding of the system and the company on all sides. Here the author, Harry B. Clayton, right, interviews Albert H. Bitzer, president of Illinois Coil Spring Co.

Now executive vice president of John A. Patton Management Engineers, Inc., Chicago, he completed 63 assignments involving most of the technical services performed by the company as an engineer. He also directly supervised 100 assignments in all phases of technical services. Before entering the consulting business, Mr. Clayton performed work in this field for Pacific Mutual Life Insurance Co., Columbia Mills Corp., Arco Co., and Eversharp, Inc.

About 80 pct of Mr. Clayton's time is presently spent in programming and the general direction of consulting assignments. He has lectured on systems and procedures work for the Illinois Manufacturers Assoc., National Assoc. of Cost Accountants, and the Society for the Advancement of Management.

Rating Programs

In an initial depth interview in one client company, the vice president for industrial relations conceded that his executive director was carrying out his functions reasonably well. In fact, he had rated him "above average" according to the standards of the company's traditional rating plan.

"However, there's just one thing," he confided to me. "I wish he had a little more initiative. I have to plan his every move. He handles a job all right, but only after I tell him how to go about it. I honestly feel that I could replace him any day in the week. I like a man who's resourceful, imaginative!"

"Did you ever tell him about this," I asked.

"No. A man either has it or he doesn't have it!"

After working with the executive in question, however, I discovered that he had a completely different concept of what it took to perform his job well.

"The old man likes to run things, make the decisions. I have to get his viewpoint on everything. It's very discouraging at times, but at least he's happy!"

"Have you ever told him about your frustration?", I asked.

"No. It wouldn't do any good; that's his nature."

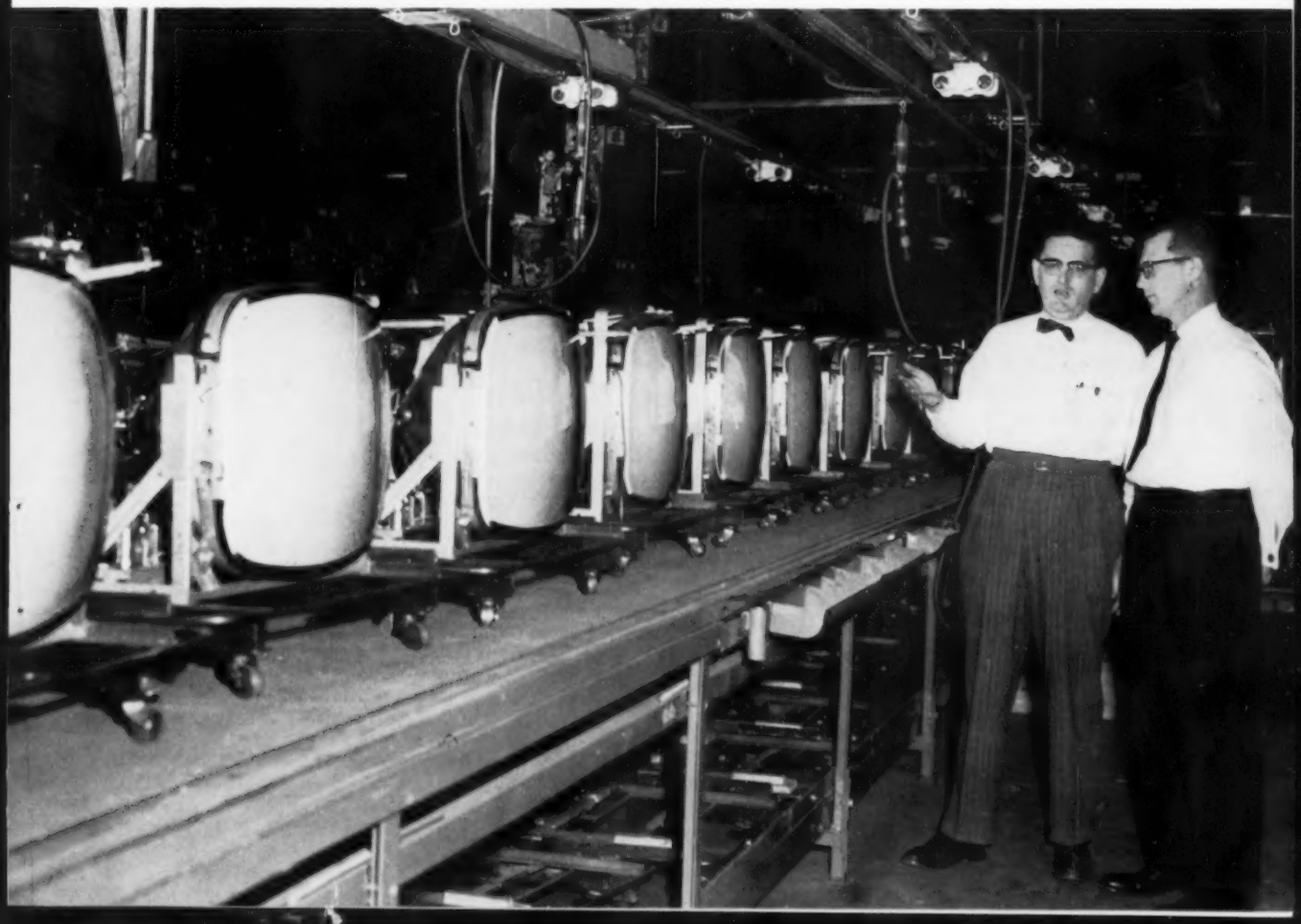
Here was a basic communication problem that would render any performance measurement useless. It had to be ironed out before the program was installed. An executive must clearly understand what is expected of him before goals are set. In other words, he must know where he stands!

ANALYSIS, NOT APPRAISAL

The administrators of a rating program should remember that their subordinates have been hired to fulfill a specific company function. It is imperative, then, that they analyze job results rather than the personality traits needed to achieve these results. Preconceived notions of the personality traits necessary for successful achievement often handicap an executive severely and unjustifiably.

It is often necessary to educate administrators in the objective ap-

FILL-IN: Walter Scott, Vice President—Manufacturing for Motorola, Inc., briefs Author Clayton.



proach to performance measurement. Our role, as consultant, is very often concerned with eliminating "bugaboos" rather than implementing programs.

RATING IS NOT ALL

Management should realize that executive performance will not stand alone as a success measure. It depends on sound selection and development techniques. The old cliche, "You can't make a silk purse out of a sow's ear," has more than a grain of truth. Many plans are unworkable because the people can't be worked with.

Much of our firm's observation of executive performance and depth interviewing techniques uncover basic weakness that never should have been allowed to contaminate the organization. So, before you set up a performance measurement program, make sure your selection and development methods are sound.

There's little sense installing a rating system if it is not preceded by a selection and development program. A rating program is for measuring executives not finding them.

Use the Target Technique

The "target" technique is one of the best ways for rating executive performance.

Here an executive sets his own objectives based on his understanding of company goals.

Through "feedback" to his superiors his plan is guided and tempered as it is put into action.

▪ Trial and error methods of performance analysis sometimes wreak more havoc in an organization than they're worth. The method that has achieved the highest degree of success according to our actual company experiences is the "target" technique.

This approach is ideal because it forces the executive to do a great deal of thinking about his job. He must decide how his function should fit into the overall company goals —which have been clearly defined to him by his superior.

He then "feeds back" the departmental goals to his superior, offering an operating plan for achievement. He plans his performance, much as a runner sets his own pace, while the superior guides and tempers the plan when it is transformed into action.

Crucial Phase—The success of this technique is dependent upon the climate. Company goals, having been defined to functional subordinates, the executives are ready to set their individual targets. The roots of success or failure take hold at this phase of the program.

It is absolutely essential that an atmosphere of desire by subordinates is created. Here is the crucial phase of the target technique. How to create desire:

1. The importance of the particular executive function must be emphasized.

2. The executive will be able to see concrete results of his particular contribution to the company.

3. He will be as important to the organization as he wants to be. The company will not limit his stature. He will establish his own stature in the company.

4. The definite advantage that will accrue to the subordinate should be clearly outlined.

5. Potential earnings of company and, therefore, individual should be charted.

6. The target technique cannot fail if the subordinate is subjected to the learning process, reading the same material as the superior. Learning together provides the spirit of cooperation.

A beneficial byproduct of this plan is that it reinstates the top executive to his rightful position as leader. He is no longer forced to assume the disagreeable role of inquisitor or master psychologist. The superior is helping the subordinate achieve his goals, to be successful. He will now listen, guide or even veto, but will never manipulate.

Key To Performance—"Job results" rather than personality traits is the key to a workable approach to performance measurement. The target technique allows the executive to be concerned with overall company goals by establishing his own objectives, rather than receiving an arbitrary goal determined by the men who alone are concerned with overall policy.

There are two good reasons why it is more desirable for a man to set his own goals:

1. An arbitrary goal determined by a man's superior may not be accepted as realistic by the man expected to do the job. In most such cases the man is quite reluctant to make it clear that he feels the goal is unrealistic and unattainable. He will resign himself to the task at hand, rather than admit that he cannot accomplish any task.

2. It is also true that a man is more inclined to set a higher achievement level for himself than when it is set by someone else. The achievement level will not only be higher, but paradoxically, it is found that he is more inclined to reach it.

New Climate—The technique of asking an individual to determine his department's objectives, provides an entirely different climate for the executive group. For in-

COMMUNICATION: Mr. Scott, center, relates company goals to Messrs. Gieffers and Nemic.

stance, one radio company president might be inclined to tell a sales manager that he expects him to concentrate on the portable TV field since this is the area that should be most productive and profitable. This would imply that if conditions change, the president will give new instructions, new goals and new objectives to the sales manager. It also means that the president must continually be doing a job analysis for all departments.

Better Approach — In another company, the president may be inclined to see that the sales manager has a complete knowledge of manufacturing economics and will ask the sales manager to determine which product could be emphasized most productively. It was found that the probability of attainment is much higher in the second case.

In the second company, the president can be quite sure that company success is not dependent upon his thinking alone, but that every executive is carrying his full weight. The executives are being asked to do an executive's job.

Some companies, applying the target technique, have become discouraged because a system that appeared simple in theory turned out to be more difficult in practice. They found, as did one company in the instrument field, that they could not hold the sales manager responsible for the total dollar sales volume. There were too many factors that influenced it, such as competitive pricing. It was this company's policy not to try to meet a competitor's price.

Switch Target—The sales man-

ager felt, however, that the total company sales would be somewhat dependent upon competitor's price differences—over which he had no control. This fact was an object of consternation to the president and the sales manager, but bilateral-goal setting enabled them to transfer their targets to sales planning. Total sales would result from efficiency in the execution of sales plans; consequently, performance measure was based on sales planning—such as:

1. The company salesmen lacked certain technical qualifications that made it difficult for them to sell certain products. If these men had an improved technical knowledge, their sales results would be improved. Specifically, it would increase the average order and, therefore, total sales.

2. Optimum sales required optimum sales coverage. In this respect it appeared that there were several geographic areas that would provide increased sales at a reasonable sales cost.

Create Harmony—In addition to these two points, a list of six other goals or objectives was made and there was complete agreement between the sales manager and the president that substantial improvement would revolve around these primary objectives. The completion dates for these objectives were on a monthly basis, providing an accurate performance measure. Sales management was now not only on a realistic basis, but its unhampered execution was insured.

This process of gradually refining the standard down to workable projects was an educational experience to both men. The president admitted that it provided him an awareness of the sales management task that he had never had before and the sales manager began to have an appreciation of the relative importance of each of the various parts of his sales management job. This resulted in a considerable change in the way he planned his job and his time.

Survey Throws Light

A survey of over 400 companies turned up some defects in standardized rating programs.

Biggest fault was that standards could not be applied equitably. More intensive systems irritated executives.

▪ In a survey of over 400 companies we found that about 43 pct were using the traditional approach to merit rating. The senior executives would complete a form, at predetermined periods, detailing opinions of their subordinates. The opinions were incorporated into the rated executives file, much as the military maintain a "jacket" on their officers. This file, of course, is the frame of reference for promotions, salary increases and transfers.

Such plans generally have been developed so that they would work as well in one company as they would in another. The formalized rating plan holds true for the comptroller as well as the shop superintendent. The superior is asked to record his feelings about such personality traits as initiative, versatility and resourcefulness.

Lack Agreement—Yet, the survey revealed a definite lack of agreement concerning the definition of such personality facets. It would be safe to assume that the senior executives were using themselves as a scale against which to measure their subordinates. The man had good judgment, if it was similar to their own.

We found that the traditional merit rating plan is not effective because it is not equitable. It is quite easy for a subordinate to take the point of view that his rating is just one man's opinion.

Many times an executive does not know how he has been rated, and in every instance he does not understand the basis for judgment. His superior has made a detailed rating of his past performance, but their relationship continues unchanged whether it has been good, bad or indifferent.

Make Intensive Study—Twenty-six pct of the surveyed firms who found the scale of measurement in the traditional approach much too shallow decided to go into a program of executive appraisal—with both feet.

In this type of program, first the executive is subjected to an investigation similar to an F.B.I. field check. His background and experience, including social and civic activities are scrutinized in order to uncover his actual or potential competency.

A group of his business associates, operating individually, make a thorough appraisal of him and his job performance.

A battery of written psychological tests are given to the executive as a diagnostic device to provide evidence for the presence of executive characteristics—or the absence of them.

The executive is then exposed to a depth interview which is designed to round out previous appraisal findings.

Not For Execs—Our firm has had considerable success in implementing this type of program, but not for executives! We use this approach in the evaluation of supervisory personnel up to and including the general foreman level. We believe this approach is sound on the supervisory level because these men have come up from the ranks and their actual or potential ability is relatively unknown to management.

We found that many companies, using this technique, had organizational problems because the executives resent being treated like a bug under a microscope. This personality appraisal technique is useful,

On Rating Problems

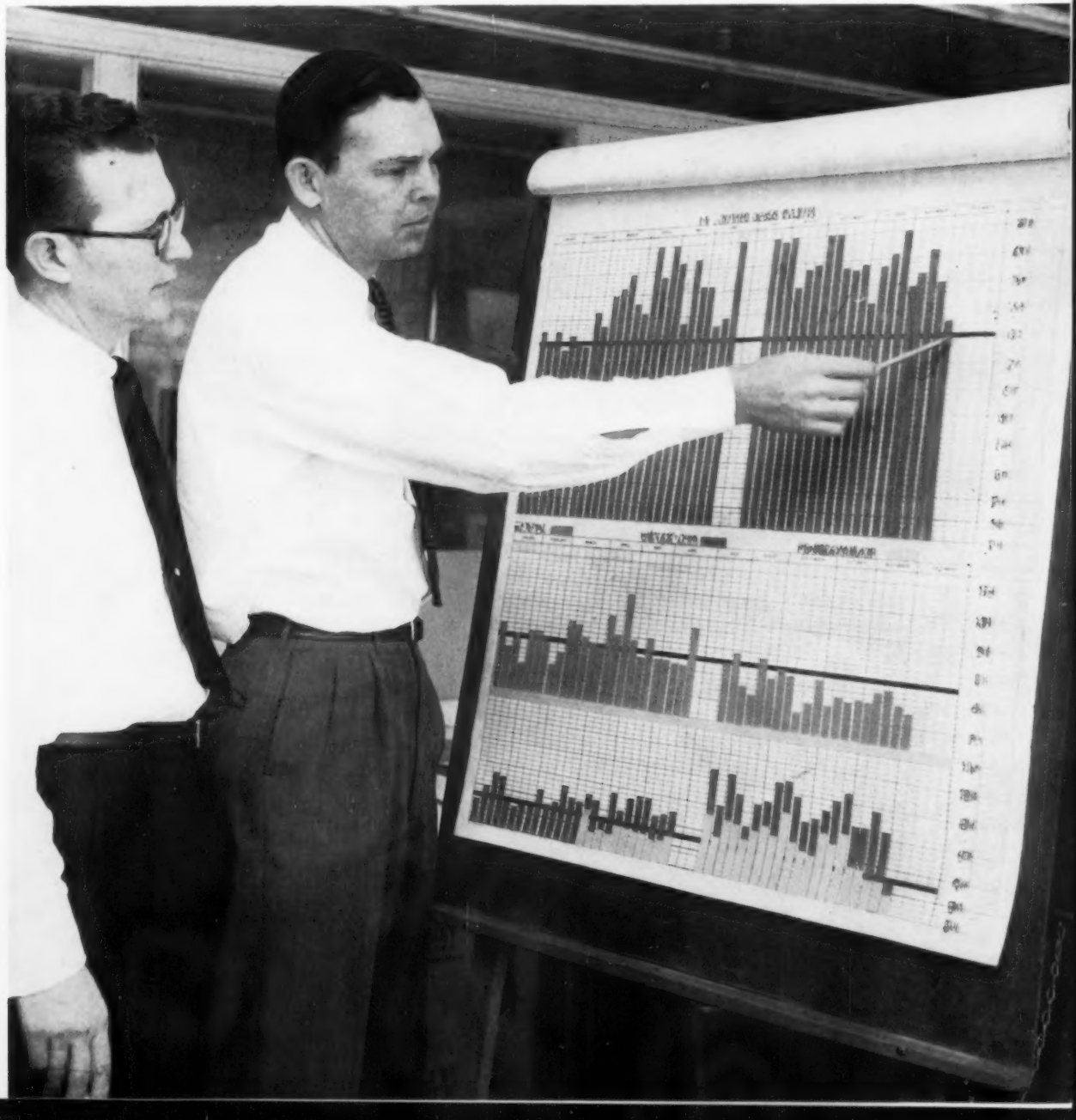
but it should have been accomplished in the selection process. It is mandatory that management appraise its supervisory personnel for training and promotion purposes, but a man should never have been placed on the executive level without a preplacement appraisal.

Look For Results—Management cannot afford to place a man in a policy-making position, involving decisions of vital import to the company, without knowing him. Once he is placed, they should only be concerned with concrete results.

Is there a universal, composite executive type as is espoused by the appraisal method? Experience tells us that there is not. We have seen executives achieve outstanding results in their function who were not considered the so called universal executive type. They did not possess the universal traits necessary for achievement of these results.

Continued

FUNCTION: Executives must each define their particular function, as Mr. Gieffers does here.



Tips on Rating Executives

Do's

1. Remember that you are rating accomplishment, not personalities.

2. The education process does not apply only to the subordinate. The superior will find that the target technique will change his own thinking as he learns more about divisional and departmental functions.

3. If there is a cardinal rule of proper administration, it is: listen, listen, listen—before you suggest.

4. The proper climate for performance measurement is absolutely necessary. In his natural desire to know where he stands, the subordinate should desire the performance interviews. Many a system has failed, because of a prevailing climate of fear.

5. Do not allow any phase of the subordinate's plan for accomplishment to remain ambiguous. He should spell it out in clearly defined terms.

6. The enthusiasm of a subordinate may very well cause his plans to veer outside the limits of company policy or goals. The superior must be alert to re-direct before action has set in.

7. The superior can demand that the proposed standard be an improvement over past attainment. Objectives may be static, but performance should improve.

8. A careful review of past accomplishments is desirable, so that there is no question in mind of the executive as to how his performance has been received.

9. Remember that bilateral understanding is worth achieving. It is worth any investment of time and patience.

Don'ts

1. Don't be misled by believing that there is some simple, easily adaptable plan for rating executives. Performance measures must be tailor-made to particular organizations.

2. Don't expect to use one scale of measurement, applicable to everyone. Each division, each department may require a different scale.

3. Don't put the cart before the horse. Overall company goals should be defined, then the divisional and departmental goals can fall into place.

4. Don't hold a man responsible for accomplishments outside of his defined area of control. In view of projected market research, a sales manager's goal may merely be to hold the line, not an unrealistic vision of market gain.

5. Don't set a subordinate's target for him by suggestion or implication. He will accept your suggestion even though the goal is unattainable, because he is reluctant to ever admit that he can't do the job.

6. The superior's role is not to sit back and lose touch with his subordinate, waiting for success or failure. Check the means of attainment, the development and the "follow through" being used by the subordinate.

7. Management will find that executives will consistently aim higher than it is possible for them to attain. The coach technique is to temper these goals with realism.

8. Don't assume that your subordinate understands everything that you communicate to him. Follow-up interviews, using the system of "feed back" will avoid much waste and confusion.

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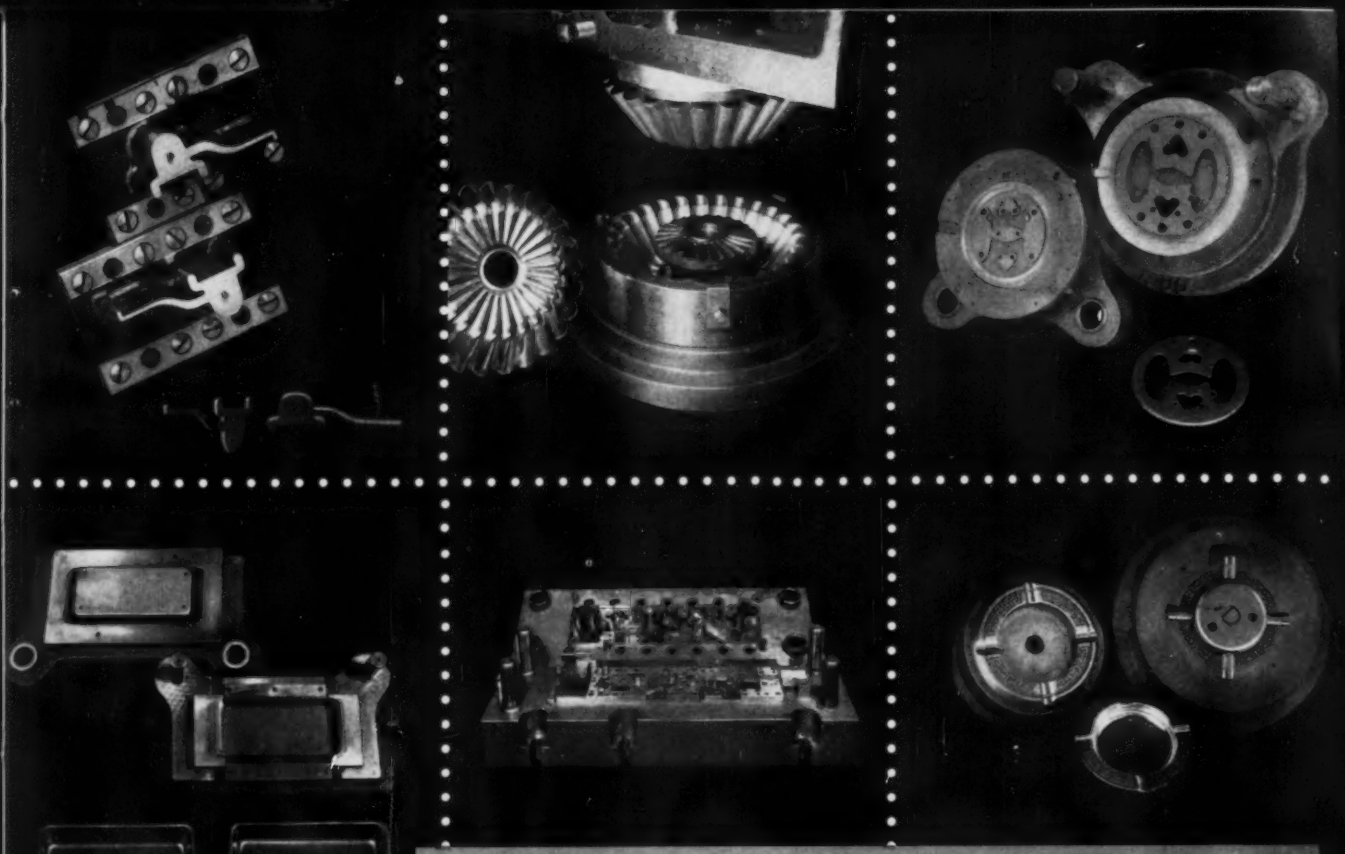

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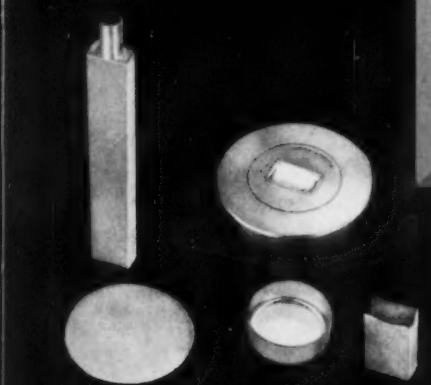

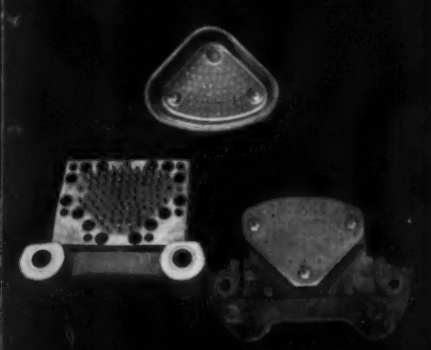

Vanadium-Alloys Steel Company

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AUTOMOTIVE

Air Suspension Makes Inroads

It's Lighting a Fire Under Springmakers

Suspension systems are getting more attention now than at any time in auto history.

Springmakers plan new advances, but better steels are needed.—By H. R. Neal.

▪ Steel springmakers are getting ready for some stiff competition from air suspension systems. A small but growing percentage of General Motors cars are coming off assembly lines equipped with air suspension.

Ford Motor Co. announces it will offer air suspension as an option on some 1958 models. American Motors is reported about to enter production with a combination coil-spring-air suspension rig for the rear only.

The Reasons—Why all the sudden interest in air suspension? One of the reasons most often given is "improved riding qualities." But this reason is aimed at consumer appeal. Says one automotive engineer:

"With the improved roads they're building today we don't need the added comfort we get from air suspension. Most people don't even realize they're riding on air unless they're told. We need space."

Looking for Room—Space is the industry's all-pressing problem. Style-conscious automakers have lowered the tops of cars. To avoid squashing passengers, seats have been thinned. Now engineers want to lower the floor pan.

But transmission and driveshaft tunnels already impose conspicuously into the passenger compartment in order to keep adequate clearances for all load conditions. A controlled, constant car height will let the engineers steal some of this space for passengers. This is the chief lure of air suspension.

Springmakers Reaction — It appears then that air suspension is here to stay. But is it?

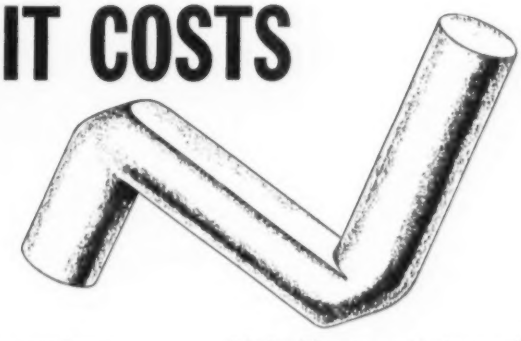
Manufacturers of steel springs for the automotive industry aren't too sure. They say yes, no, and maybe. But they are waiting for some reliable indications of air spring popularity before going out of business.

Surprisingly, a number of steel spring manufacturers see a lot of desirable effects on their industry stemming from the advent of air springs. One admitted the industry, visualizing few threats to its market, had become complacent. He is encouraged by the fact automakers are showing an interest in suspensions.

Research Begins—A representative of another company explained better steel spring suspensions could have been available in the past, but for one thing, automakers didn't want them. For years, he said, the only demands by car manufacturers were to cut costs. Our development money was spent trying to cut costs, he said. Today, it appears they are prepared to put a little

NO CHANGE: AMC demonstrates stability of its Ambassador when empty and fully-loaded by means of markers placed at front fender and rear tail fin. Car is equipped with combination coil spring-air suspension system.

COLD HEADING: A WAY TO CUT UNIT COSTS



- **Eliminates extra operations; faster than forging**
- **Metal flows to shape — without waste, without machining costs**

Here's a manufacturing fact often overlooked: The same machines that spill out large volumes of standard fasteners at surprisingly low cost can also produce *special* mechanical parts . . . also in volume and also at low cost.

It's surprising what an *expert* can do with cold heading machines. Some parts that would otherwise be two or more pieces are turned out as uniform, integral units. Parts that would otherwise require slower, costlier machining spout from the cold header with little or no scrap loss. What's more, the pieces are stronger.

Case Histories: (1) Eliminating double forging operation, high speed cold heading machine cuts and bends lengths from continuous rod to form shifter lever. It also gives greater strength, improved finish, closer tolerances. (2) Instead of a machined screw assembled with separate stamped screw driver shield, hose clamp screw is now cold headed in one piece. (3) No longer cut on screw machine, insert screw for plastics costs 40% less. Cold header uses just amount of metal required.

Call on the RB&W Fastener Man. He can tell you whether or not cold heading is feasible for producing your screw machine parts, forgings and small assemblies. If so, RB&W facilities can handle your volume needs. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

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Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Fargo. **Distributors from coast to coast.**

Spin-Lock Screws Eliminate Washers

Ratchet action teeth on Spin-Lock Screws bite into the seat of any surface the screw is driven into. Their tight hold requires about 20 per cent more torque to loosen than to tighten. With this strong grip, separate washers or other locking devices are unnecessary. One-piece Spin-Lock construction gives faster assembly, lowers inventory needs—and affords fasteners that will stay tight in products subjected to vibration or repeated heating and cooling. Send for bulletin.

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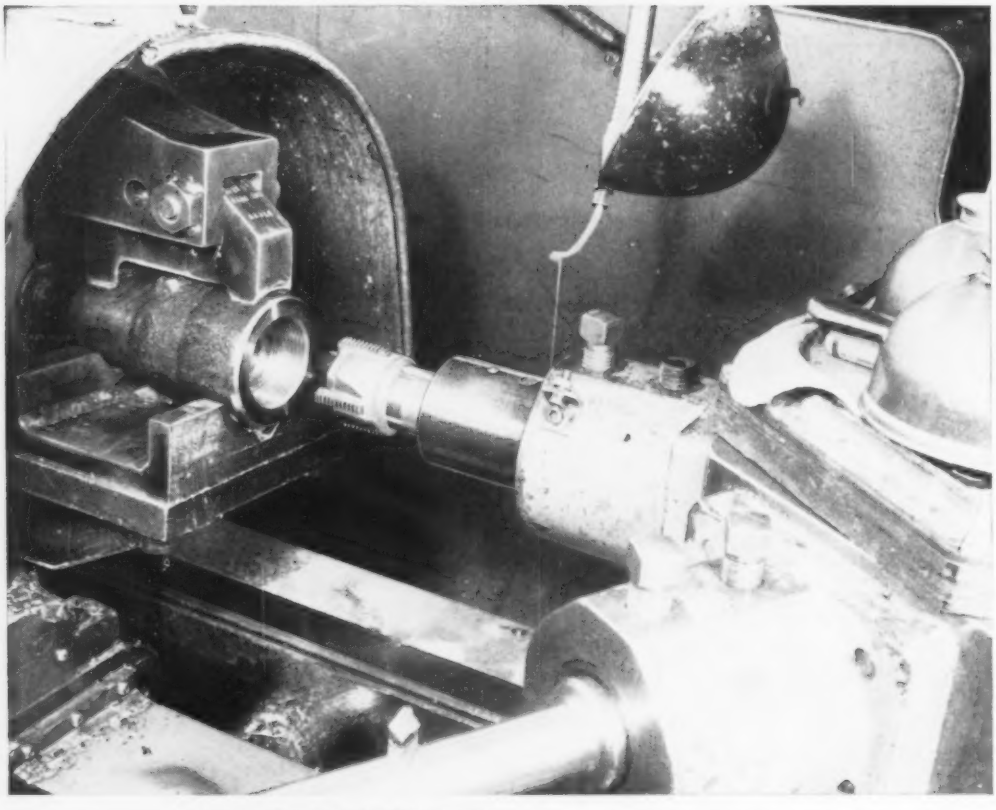
Double hex RB&W bolts and nuts measure smaller across their points than single hex fasteners. Used with an external socket wrench, they permit optimum driving torque to be applied.

Thus, while fitting cramped spaces in compact assemblies, these fasteners also assure proper preloading for *stronger* connections.

Available with plain flange, or SPIN-LOCK design.

RB&W FASTENERS—STRONG POINT OF ANY ASSEMBLY



TWO

LANDIS Solid Adjustable Taps interchanged to thread valve body

Both taps are used at the same turret station (since others are required for additional tooling) —each shank has an open keyway for securing the tap in turret position to facilitate interchange. The low cost LSA Tap is also ideal for this type of operation where the small number of workpieces does not justify a Collapsible Tap.

In the first operation (illustrated—at the Fisher Governor Company in Marshalltown, Iowa), a $2\frac{1}{2}$" LSA Tap produces $2\frac{1}{2}$" 8-pitch UN threads of excellent quality $\frac{15}{16}$" long at 23 SFM. In the interchange, a $1\frac{3}{4}$" LSA Tap produces a $1\frac{3}{4}$" 12-pitch UN thread $\frac{9}{16}$" long on the same workpiece. Both threads are cut to Class 2B fit on the WCB 1020 steel bodies with approximately 150 pieces completed before regrinding the chasers.

LANDIS Solid Adjustable Taps supplement the regular line of LANDIS Collapsible Taps, and are available in 15 sizes to tap diameters from $1\frac{1}{16}$" to 9". They feature infinite size adjustment within the range of each tap, and are rigidly constructed with all parts subject to wear nitrided after heat-treating. Through the use of LANDIS Tap Chasers, threads of excellent finish are produced with minimum tool cost. For more information, ask for Bulletin G-92.

401

LANDIS *Machine* COMPANY

WAYNESBORO · PENNSYLVANIA

Automotive Production

WEEK ENDING	CARS	TRUCKS
Jan. 24, 1958	111,012	18,041
Jan. 18, 1957	109,761	18,627
Jan. 26, 1957	145,191	23,138
Jan. 19, 1957	145,761	22,151
TO DATE 1958	389,095	62,230
TO DATE 1957	529,297	75,543

*Preliminary Source: Ward's Reports

money back in suspension systems.

Springmakers are confident they can make steel do anything air can and at a lower cost. Now they are hustling around to prove it. For a starter, one pointed out some current designs of both coil and leaf springs achieve a variable rate effect competitive with air springs. Further improvements also depend on another industry with a lot at stake in the steel spring business—the steel companies.

Improved Steels Wanted—There is a need for high strength steel with higher physical qualities—to get higher stresses into springs. Steel spring manufacturers say they must widen the price margin between steel and air springs. So far, test materials have been spotty in their performance.

Several approaches are being taken to achieve air suspension's big advantage—automatic leveling. Here, the individual companies are on their own. And they are not all in agreement as to the best way to solve the problem.

New System Coming—One company said it expects to have a leveling device ready to offer to auto companies within a month or so. It claims the system will be able to operate with any mechanical spring system. In addition it can be either a factory or dealer installed item. Of course, they prefer to see it incorporated as standard equipment.

Presumably, this system is operated by an electric drive motor, somewhat similar to that formerly used by Packard. At least the presumption wasn't denied. This could also be the simplest and least expensive approach—which should increase its attractiveness. Production cost estimates place it well under half the air suspension price. Other spring manufacturers reportedly are working on similar systems.

Combined Benefits — But there are still others who see a certain magic in air. And they see big advantages to be gained by combining air and steel springs, so they are working on combination systems. These could be made to work with coil springs, as does American Motors, or with leaf springs.

Significantly, all of these leveling systems are being developed for the rear of a car only. While they can be quickly modified to include the front suspension, cost-conditioned springmakers view this as needless extravagance. One pointed out that nearly all weight added through passengers or cargo is distributed on the rear axle. Even under a maximum load condition there is very little displacement of the front-end—usually under 1 in. for a conventional suspension system.

Other Air Uses — An air-steel combination rear suspension will also let an automaker continue to take advantage of another air system exclusive — the air supply. Reportedly, research and development is under way to use the air supply on a number of accessory items. These could include power brakes, window lifts, windshield wipers and washers, door locks and other devices.

At the same time, the steel springs will serve the same functions they do today. They will provide springing. And they will act as the link between axle and frame, without the need for more complicated trailing arms or special linkages.

Springmakers Timetable — How successful do the steel spring manufacturers think they will be in reducing the auto industry's air supply? Naturally, they hesitate to say. But it is possible one or some of these systems will be in use on 1959 model cars. It is very likely they will be used in 1960.

THE BULL OF THE WOODS

OH, JUST FIXIN' UP MY PLACE A LITTLE WHILE I'M LAID UP WITH THIS BUM HAND!
WELL, I HATE TO TELL YOU, ALEC, BUT THEY GOT AN APPRENTICE BOY RUNNIN' YOUR MACHINE WHILE YOU'RE OFF--HE USED TO BE A PLASTERER AN' CEMENT MAN!
WONDER WHY SO MANY CEMENT MASONS IS GOIN' IN FER TH' MACHINE TRADE!
A MASON TOLD ME THAT THERE AIN'T ENOUGH MACHINIST WORK TO KEEP A MASON BUSY IN HIS SPARE TIME, SO HE'S GOIN' MACHINIST SO HE CAN CEMENT!
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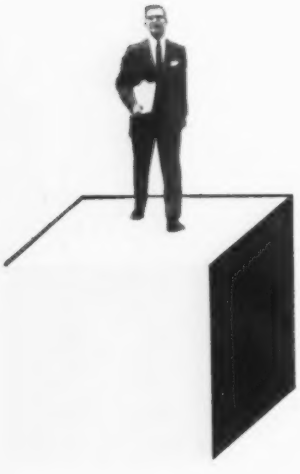

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Ike's Labor Plan Lacks Appeal

Many Points Are Familiar to Congress

Moderate approach to labor legislation is advanced by President Eisenhower.

"Clean union" measures may not stir up much congressional reaction.—By G. H. Baker.

■ Congress is taking a close look at President Eisenhower's proposed "clean unions" labor law. But the plan has thus far failed to touch off any heavy demand for enactment in either the Senate or the House.

Mr. Eisenhower's plan is moderate in tone. Many of his individual points are repeats of "clean union" requests he has made of the Congress in other years.

Here are the main points in the new White House request:

Full disclosure to the government of health, welfare, and pension plans. Unions favor this point. Congress is agreeable. This point is likely to be written into law this year.

Full disclosure to the government of union finances. Rank-and-file union members to have right to sue officers. Congress is cool on this.

Unions must certify to the government that all officers as well as delegates to conventions were chosen by secret ballot. Most unions oppose this.

Employers and unions must report on financial dealings with each other. Not much opposition here. Purpose is to stop collusion. This point may be enacted.

All above to be filed with a new official, a Federal "commissioner of labor reports," who would be empowered to seek injunctions and to issue subpenas to enforce accurate reporting. This is doubtful.

Federal penalties to be imposed on violators of reporting requirements. Among other things, unions could lose tax-exempt status and Federal bargaining rights. Also doubtful.

Outlaw "hot cargo" clauses in union-management contracts by forbidding the coercion of employers by unions to enter into agreements to stop doing business with other firms. But this is not to prohibit strikes against firms doing work "farmed out" by struck firms. Also, Ike asks a law to ban picketing to force union recognition when the employees have formally rejected the union. Unions are strongly protesting these points. Doubtful if they'll be approved.

Top-Heavy Defense

Two top-notch business leaders say the nation would be much farther ahead in missiles and rockets developments if the government fired about half of its Pentagon "experts."

Trouble is, claim Dan A. Kimball (president, Aero-Jet General) and Lawrence A. Hyland (general manager, Hughes Aircraft) most of the Pentagon "experts" do little more than pass papers around and try to second-guess the engineers in industry.

Is Easier Money Too Little Too Late?

Won't Silence Critics — Recent Federal Reserve Board and banking actions will make borrowing less costly to business. But critics of the Eisenhower Administration's close watch on credit supplies aren't happy.

The FRB last week approved a 2¾ pct interest rate for loans the Federal Reserve Bank of Philadelphia makes to member banks. This decline from the former 3 pct rate apparently signaled similar rate-trimming in other Reserve Bank areas. And large commercial banks in the East began reducing their prime interest rates.

Business Needs Prodding — Democrats in Congress, however, took the Administration to task for failing to relax its credit policies sooner. Some viewed the FRB move as indicating a tardy realization by the Administration that sluggish business operations need some prodding.

In addition to shrinking the discount rate, the FRB this month also has whittled the margin rules for stock buyers. Buyers now are required to put up only 50 pct of the stock price, rather than the former 70 pct.

Other Actions—Another important money move by the FRB may be on the way. Commercial banks in some cities must maintain 20 pct of deposits as a reserve for customer protection. Percentage is lower in other areas. The FRB may allow the banks to keep a lower cash reserve, thus permitting more money to be put out on loan.

These actions may give a desired stimulus to business and industry. They are unlikely to quiet criticism of "tight money," though.

Largest Special Metals Company Formed

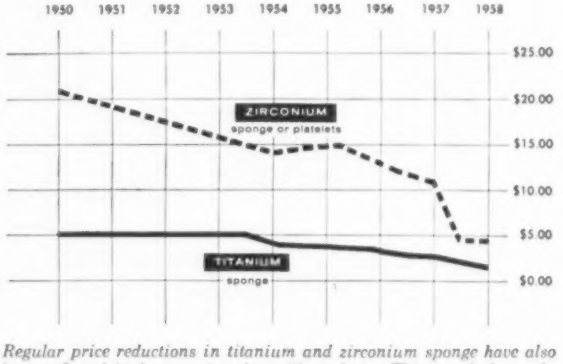
MALLORY-SHARON NOW INTEGRATED PRODUCER OF TITANIUM, ZIRCONIUM, SPECIAL METALS

Mallory-Sharon Titanium Corporation has broadened its scope in the special metals field with acquisition of all the titanium and zirconium sponge production facilities of National Distillers & Chemical Corporation, plus full ownership of Reactive Metals, Inc., formerly owned jointly by Mallory-Sharon and National Distillers.

Our new name is Mallory-Sharon Metals Corporation. Our products include titanium, zirconium, and hafnium in sponge form and in a broad range of mill products including sheet, plate, rod, bar, billets, etc. Planned for the future are other special metals.

LOW COST PROCESS—Now a fully integrated producer, Mallory-Sharon will use the new sodium reduction process for making titanium and zirconium sponge. This process is believed to be the lowest cost method developed to date for this purpose, and produces metal of unusually high ductility. It will contribute to making titanium and zirconium economically attractive in more and more applications.

WHAT THIS MEANS TO YOU—Mallory-Sharon's leadership in the special metals field will mean continuing improvements and importance to these metals. In addition to titanium's broad use in aircraft and missiles, and zirconium's in the nuclear field, both metals provide exceptional corrosion resistance—offering lower costs in a broad range of processing and industrial applications. Let us help *you* design ahead with these new metals.



Regular price reductions in titanium and zirconium sponge have also been reflected in lower prices for mill products. This trend shows the wisdom of evaluating titanium and zirconium now for your new products.

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Will Russia Invade Jet Market?

Reds Could Sell at Half U.S. Prices

Russia is eager to compete in still another area: The commercial jet market.

And they are now flying a plane bigger than any the U. S. plans.—By R. R. Kay.

▪ Sputniks are not the only challenge the Russians are throwing at the U. S.

There's a new one on the horizon: Jetliners to sell at half the price of ours.

The Russians are after world airline orders. There are reports they've talked sales with a customer of Douglas Aircraft.

First With the Biggest — This could be a real threat to the Coast's aircraft industry which has contracts to make some 90 pct of the world's jetliners.

Right now it's sitting pretty with $2 billion in firm orders. But the world's airlines will need another $1 billion to $2 billion in jet equipment before 1967.

Russia is now flying a 170- to 180-passenger turboprop airliner. And you have the word of President Donald W. Douglas, Jr., that this Russian transport is bigger "than anything we have on the drawing boards."

Reds Are Subsidized — The Douglas DC-8 jetliner, to carry 118 to 144 persons, sells for $5 million. There's no price tag on the Russian Tu-114, a 170- to 180-passenger jet. But it's understood in the trade that the 70-passenger Tu-104 is offered at $1.5 million. "We can't build that size here for double that," Mr. Douglas says.

How can the Russians do it? By government subsidy. It's a grave challenge to our aircraft industry which must come up with an answer.

Glide Rocket On Way?

We may have glide rockets that zoom, glide down, zoom again, and keep going like this until they drop on target. Sound Buck Rogerish? Boeing engineers may soon be working on them.

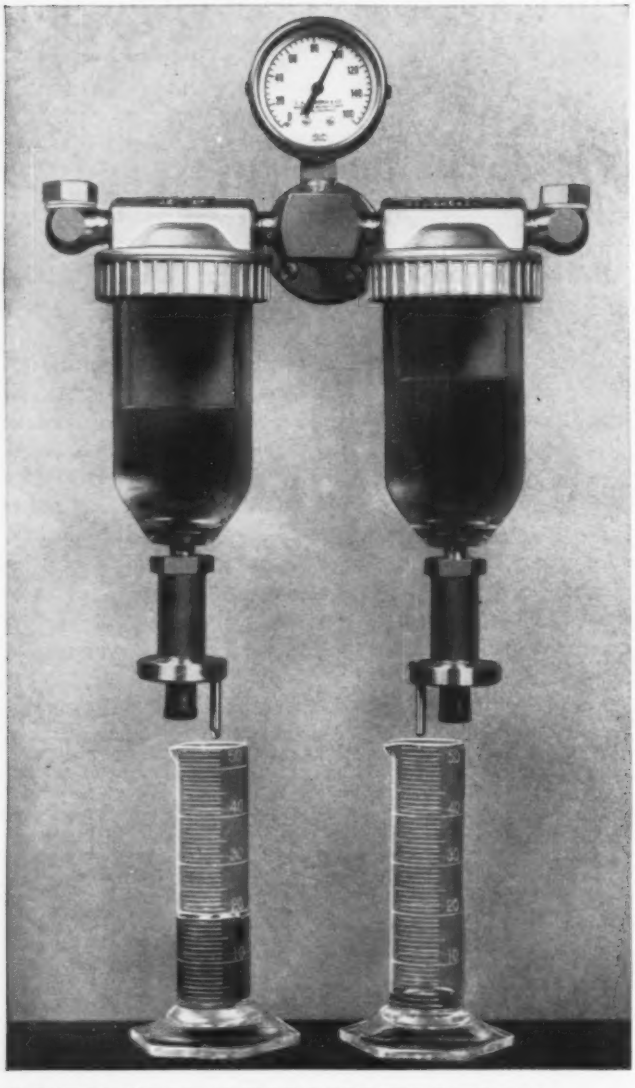
Seattle's Boeing Airplane Co. lost the important WS-110 chemically-fueled bomber contract. But it may come out on top in the long run. Glide rockets may obsolete the chemical bomber before it even flies.

Good break for Boeing: the research it did on the chemical bomber project and the information it gained can be used on glide rockets.

Meanwhile, Boeing will probably get a good chunk of the sub-contracting work from North American Aviation's WS-110 contract.

Massive Beams Used for Jet Age Job

PLATE GIRDER CHAMPIONS: Welded plate girders on new United Air Lines jet aircraft hangar under construction at San Francisco are largest ever made in the U. S. Fabricator was Pacific Iron & Steel Corp.



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Tool Sales Continue in Tailspin

December Was Poorest Month Since 1949

New orders for machine tools continued their downward plunge in final month of 1957.

And the prospects of developing new strength in market are slight.—By E. J. Egan, Jr.

▪ After hovering in the $28-$29 million-per-month range from September through November last year, net new orders for metal cutting machine tools dropped to an estimated $18.7 million in December. It's the worst new-business month the industry has had since October, 1949, when bona fide orders totaled only $16.2 million.

For 1957 as a whole, net new orders came to $519.8 million. Taken by itself, that's a respectable figure for a "peacetime" year—even though it's a poor match for 1955's $927 million and the 1956 total of $924 million.

(The long-range prospects of the machine tool industry and some of the specific solutions to the present sales setback are analyzed in a Special Report starting on p. 49.)

Downhill Slide—But you miss something significant if you swallow these yearly totals in one gulp. They don't show the month-by-month trend line. Last year, for example, it skidded downhill precipitously, from $63.3 million in January to the $18.7 million low point in the final 31 days. It's safe to say that not one builder in the country could have guessed such a thing would happen.

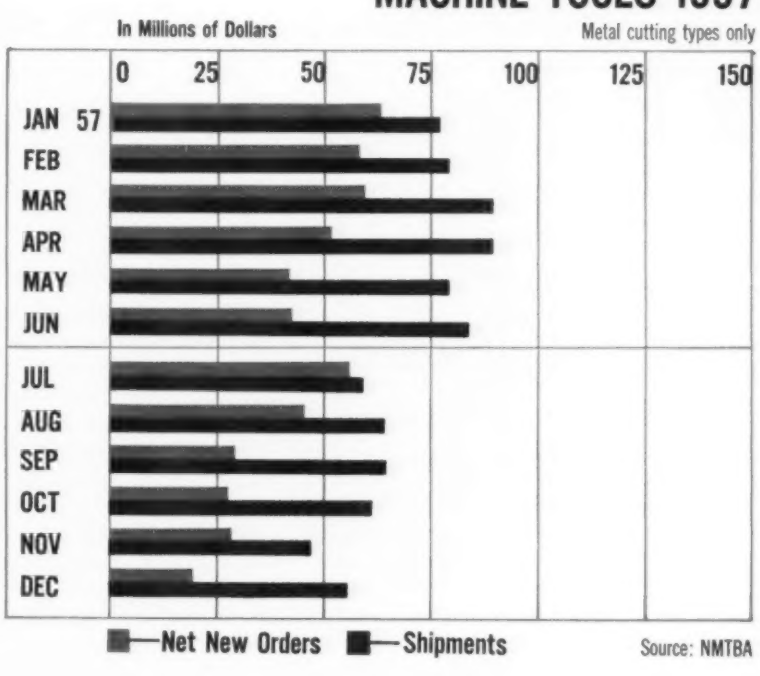
As a result, 1958 becomes a bigger question mark than ever. True enough, builders boosted their December shipments to $55.5 million, bringing the yearly total to $843 million. But they can't keep up the December pace. At that rate, they'd be worked down to empty assembly floors in nothing flat. The industry's backlog at the moment is about an even three months. For many individual plants it's much less than that.

Search for a Spark—When and if an upturn in business comes, what will spark it? The automotive industry? Aircraft and missiles? A sudden, coincidental need among all segments of the metalworking industry for new tools to replace obsolete ones?

Trying to evaluate any one of these three potentials is like looking into a dark closet. Auto firms, troubled by lagging sales and a series of tough union demands, don't inspire much confidence for the first half of 1958, at least.

Don't Bank on Missiles—The multi-billion dollar aircraft and missile programs will involve a lot of high priced thinking, prototype building and testing. Production, as far as machine tools are concerned, will probably never be anything like the conventional armament booms we've seen in the past.

As for a widespread industry program of machine tool replacement, it's unlikely to happen all at once. Builders have been pushing hard at this wall for several years. A few bricks are dislodged from time to time, and that's about the size of it. Still, the average builder sees this market as his best hope.



INDUSTRIAL BRIEFS

Titanium and Texas — Titanium Metals Corp. of America has opened a district sales office in Dallas, Tex. It will serve the needs of aircraft and missile manufacturers, chemical process equipment builders, and electronic designers in the Southwest. The office complements similar TMCA facilities in New York, Cleveland, Chicago, and Los Angeles.

Nice Work — U. S. Industries, Inc. has opened a modern laboratory and plant in Pompano Beach, midway between Palm Beach and Miami. The facility is called Kett Technical Center, Inc. It is a subsidiary of USI, and will perform top-level research and development work for USI's 12 manufacturing divisions. The campus-like plant of 20,300 sq ft is located on a 25 acre site.

Power for Venezuela—Westinghouse will build a gas turbine power station with automatic remote controls for Compania Shell de Venezuela. It will power a new $85 million oil storage and tanker-loading facility on Lake Maracaibo. The station will be constructed and equipped by Westinghouse International Co. at a cost of over $3 million. Delivery of the gas turbines is scheduled for June and July.

"Brewster, these long coffee breaks have to stop!"

More Bridge Work — Fort Pitt Bridge Works has received its third major structural steel fabricating contract for the Central Viaduct project of Cleveland's Innerbelt Freeway. This contract covers 6,500 tons of structural steel for the east approaches to the 2720-ft-long bridge. Fort Pitt Bridge fabricated 13,000 tons of steel for the nine span bridge and is presently working on a 1800-ton contract for the west approaches, making a total of more than 21,000 tons of structural steel for the project.

Chance Contract—An additional contract for about $26.2 million was awarded Chance Vought Aircraft Co. for evaluation and production of the REGULUS II missile. The contract provides for spare parts and special support equipment estimated at an additional $7.4 million. REGULUS II is destined to go aboard submarines such as the Navy's first nuclear-powered missile sub, the USS HALIBUT, now under construction.

Hot Water Market—Rheem Mfg Co. has completed arrangements for making and selling its products in Belgium and Canada. This brings to 18 the number of plants making Rheem products in 12 nations abroad. The new international agreements call for manufacture and sale in Canada of Rheem automatic storage water heaters and manufacture and sale in Belgium of Rheem water heaters and inner-protective coatings for steel drums and pails.

Missile Christening—The Army's new solid propellant missile has been named the Pershing. Named after Gen. John J. Pershing, the new missile will soon be under development and will succeed the Redstone. While retaining Redstone's mobility, field worthiness and accuracy, Pershing will be smaller, lighter, and even more mobile. It will provide the Army a more versatile and flexible weapon with which to discharge its role on the battlefield of the future.

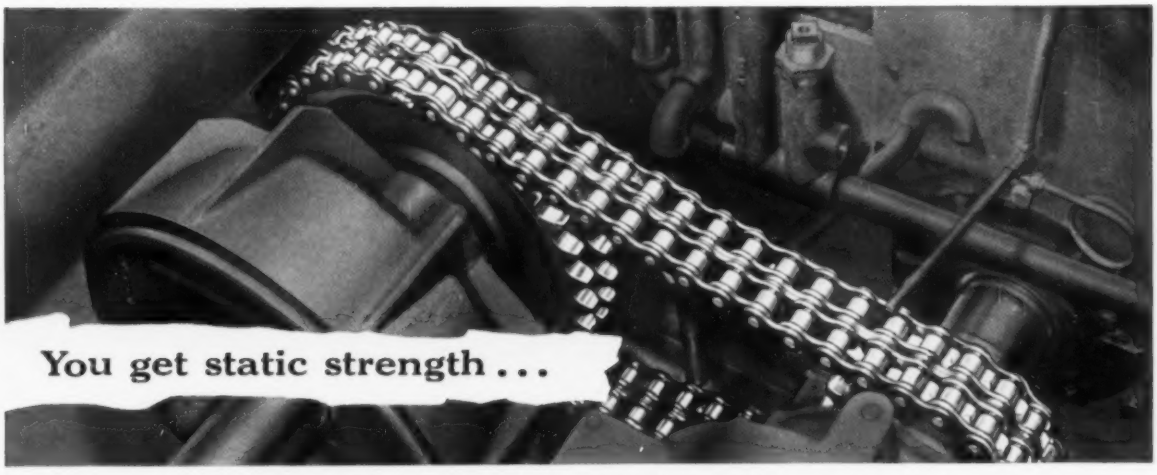
Candidates Wanted — Nominations are now open for the 1958 Doehler Award which recognizes outstanding contributions to the advancement of the die-casting art. Award consists of a plaque and cash honorarium of at least $500. It is made annually by the American Die Casting Institute. Considerations that govern the Award Committee in the selection of the recipient are: Technical achievement; advancements in plant operations; and other activities. Nominations should be submitted before Apr. 15, 1958.

Less Work for Pilots — Hughes Aircraft Co. was awarded a $21,188,717 contract by the U. S. Air Force for additional production of airborne control and weapons systems for advanced all-weather jet interceptors. This increases total contracted expenditures for this particular weapons system to more than $120 million. The systems will fly supersonic jets from "take-off to touchdown," leaving the pilot free to make vital tactical decisions in aerial combat. They are in production at Hughes' El Segundo, Calif., plant.

Walking Purchase — Wheeling Steel Corp. obtained the exclusive manufacturing rights for production of ANCOR floor plates. They are being marketed by Ackermann Mfg. Co., a sales subsidiary. The floor plates are being made at Wheeling Steel's Ackermann factory in Wheeling from die-punched rolled steel.

Aluminum Insulation Facts—Accurate calculations of the value of aluminum - clad insulations have been made available by Aluminum Co. of America. Conducted by the National Bureau of Standards, the study was aimed at securing data to determine heat transmission values when aluminum is used either alone or in combination with other insulating products in any confined space. The conclusions, in book form, are now ready for architects, builders and the air conditioning and insulation industries.

Why tough-service drive and conveyor jobs demand LINK-BELT roller chain



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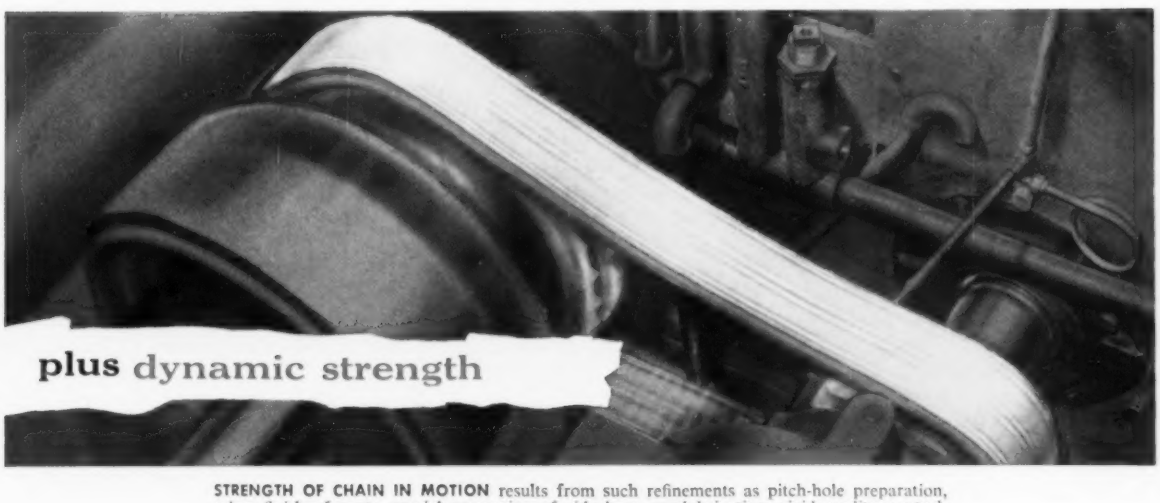

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L. B. Rosseau, elected president and treasurer, Ajax Electric Co., Philadelphia. In the issue of Jan. 16, Mr. Rosseau's name was spelled incorrectly.

A. D. Dauch, appointed vice president, foreign sales, Salem-Brosius, Inc., Pittsburgh.

P. H. Lauer, named controller, Flexonics Corp., Maywood, Ill.

J. F. Forster, named president, Vickers Inc., Detroit.

W. C. Clark, named asst. to vice president, sales, Pennsylvania Flexible Metallic Tubing Co., Philadelphia.

W. W. Gilbert, appointed manager, Detroit district sales office, Boiler Div., The Babcock & Wilcox Co., Detroit.

E. L. Prais, named factory manager, Madison Industries Inc.

Victor Holt, Jr., named vice president, sales, The Goodyear Tire & Rubber Co., Akron, O.

T. F. MacLaren, appointed general sales manager, Machine Tool Div., Brown & Sharpe Mfg. Co., Providence, R. I.

M. W. Klippel, appointed eastern regional sales manager, National Automatic Tool Co., Inc.

T. S. Green, Jr., appointed manager, personnel development, Norton Co., Worcester, Mass; **R. W. Cornish,** named manager, sales training; **P. B. Marshall,** becomes supervisor, recruiting.

C. A. Mathews, appointed superintendent, Cold Strip Dept., Coshocton, O. plant, Universal-Cyclops Steel Corp; **J. E. Egan,** appointed manager, marketing research, Sales Dept.

E. J. Van Valkenburgh, appointed director, procurement and material services, Alco Products, Inc.

L. E. Townsend, named manager, Piqua, O., Tubing Plant and Piqua Quarries, Armco Steel Corp.

T. J. Gorman, promoted to asst. to works manager, special assignments, West Leechburg, Pa., Works, Allegheny Ludlum Steel Corp.

R. N. Wolfe, appointed general manufacturing manager, Adhesives, Coatings and Sealers Div., Minnesota Mining & Mfg. Co; **W. C. O'Leary,** appointed technical director for the division.

D. T. Sicklesteel, appointed manager, Detroit office, Warner Automotive Div., Borg-Warner Corp.

H. G. Becker, Jr., appointed southern regional manager, Latrobe Steel Co., Latrobe, Pa.

F. W. Elliott, elected vice president, H. K. Porter Co., Inc.

R. H. Bennewitz, named asst. manager, Railroad Dept., Linde Co., Div. of Union Carbide Corp.

J. W. LaRocque, appointed manager, national sales, Inland Steel Container Co., division of Inland Steel Co.

R. L. Shuman, Jr., appointed director, corporate accounting, Westinghouse Electric Corp., Pittsburgh.

J. W. Hardesty, appointed general manager, sales, Construction Equipment Div., Baldwin-Lima-Hamilton

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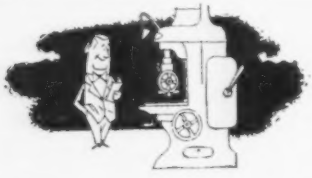

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Corp., Lima, O.; **H.W. Read,** named manager, parts and service; **William Lutes,** parts sales manager.

J. D. Cavan, appointed asst. general manager, sales, Bolt and Nut Div., Republic Steel Corp.

L. S. Hilton, appointed sales manager, Abrasive and Diamond Wheel Depts., The Manhattan Rubber Div., Raybestos - Manhattan Inc., Passaic, N. J.

H. W. Cook, Jr., appointed district sales manager, Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.

A. C. Wenzel, named production manager, Republic Flow Meters Co., subsidiary of Rockwell Mfg. Co.

Harry McCormick, appointed sales manager, Hercules Steel Products Co., Galion, O.

C. W. Selover, named manager, purchases, Hooker Electrochemical Co. plants at Niagara Falls and No. Tonawanda, N. Y.

R. W. P. Johnson, promoted to asst. New York district manager, The Cooper - Bessemer Corp., Mount Vernon, O.; **C. J. Havekotte,** promoted to New York branch manager.

W. H. Zinn, named director, purchases, Wheeling Steel Corp., Wheeling, W. Va.

J. A. Summer, appointed manager, export sales, Lycoming Div., Avco Mfg. Corp.

R. M. Clarke, appointed sales manager, Eastern Steel & Metal Co., Inc., West Haven, Conn.

R. E. Kirby, appointed manager, Westinghouse Electric Corp.'s electronics operation, Baltimore, Md.; **J. M. Beggs,** appointed manager, Ordnance Dept.

H. R. Bohme, appointed asst. purchasing agent, Fontana plant, Kaiser Steel Corp.

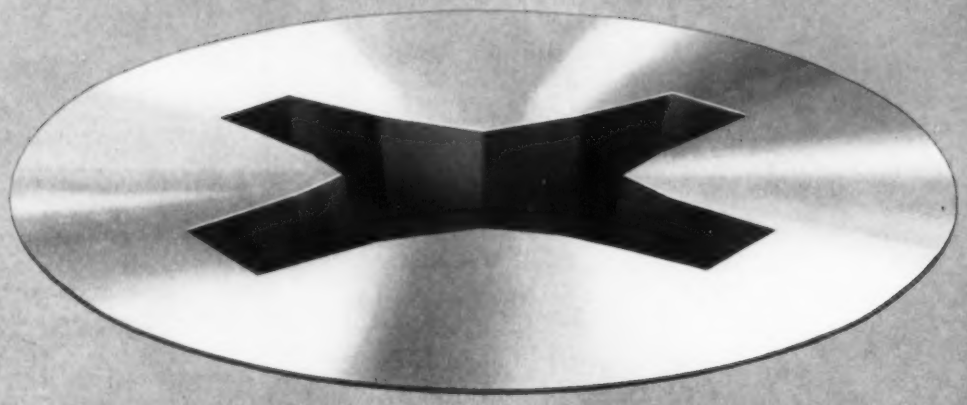
R. F. Parker, appointed manager, cutting tool sales, Metallurgical Products Dept., General Electric Co., Detroit.

K. E. Heller, appointed sales manager, Helipot Div., Beckman Instruments, Inc., Newport Beach, Calif.

Dr. George Manov, named technical director, Reactor Monitoring Center, Richmond, Calif., Tracerlab, Inc., Woltham, Mass.

J. C. McMichael, appointed plant superintendent, Harrisburg, Pa., U. S. Steel Homes Div., U. S. Steel Corp.; **G. L. Dannenfelser,** ap-

Cut assembly time—lower production cost



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pointed plant superintendent, Indiana operation; **J. I. Delattre,** appointed asst. chief engineer of the Division, Harrisburg plant headquarters.

H. C. Ness, appointed manager, cost and statistics and **H. F. Wox,** as asst. manager, works accounting, American Steel & Wire Div., U. S. Steel Corp.

I. S. Dow, named manager, Cleveland operations, Aluminum Co. of America.

C. E. Cronauer, Jr., promoted to asst. to general traffic manager, and **N. S. Brubeck,** named manager, transportation, American Steel & Wire Div., U. S. Steel Corp.; **E. H. Finneran,** appointed traffic manager, western area, Chicago.

F. B. Steele, appointed district manager, Chicago, Ill., The Industrial Div., Gould-National Batteries, Inc., Trenton, N. J.

George Milburn, appointed general manager, Canadian operations, The Patterson Foundry & Machine Co., E. Liverpool, O.

Thomas Buckley and **D. E. Fenton,** assigned as sales representatives, Indianapolis and Youngstown districts, respectively, Allis-Chalmers Industries Group.

W. F. Miller, appointed sales engineer to service customers, Atlantic seaboard district, Kaiser Chemicals Div., Kaiser Aluminum & Chemical Corp.

E. M. Cummings, named manager, piling sales, Bethlehem Steel Co., Bethlehem, Pa.; **J. R. LeCron,** named metallurgical engineer, Steel Div.; **R. C. Reber** becomes asst. metallurgical engineer.

Clinton Bennett, appointed field liaison engineer, Lewis-Shepard Co., Watertown, Mass.

A. L. Olender, named development engineer, Speer Carbon Div., Speer Carbon Co., St. Marys, Pa.

R. F. Benson, named manager, purchasing research, U. S. Steel Corp.

A 3M Case History Report

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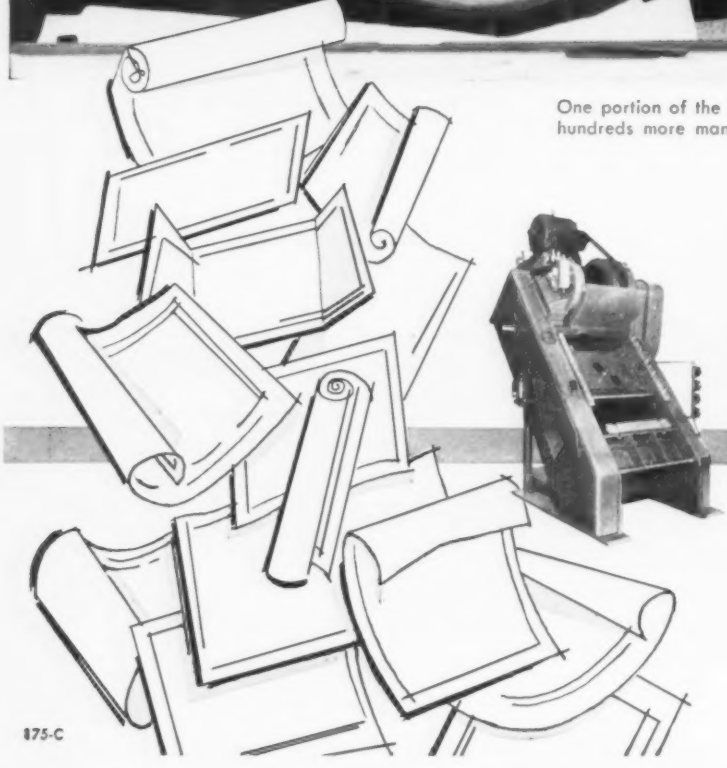

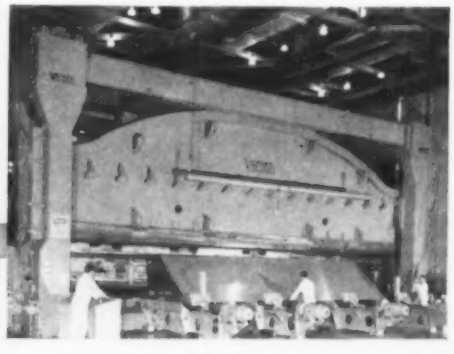

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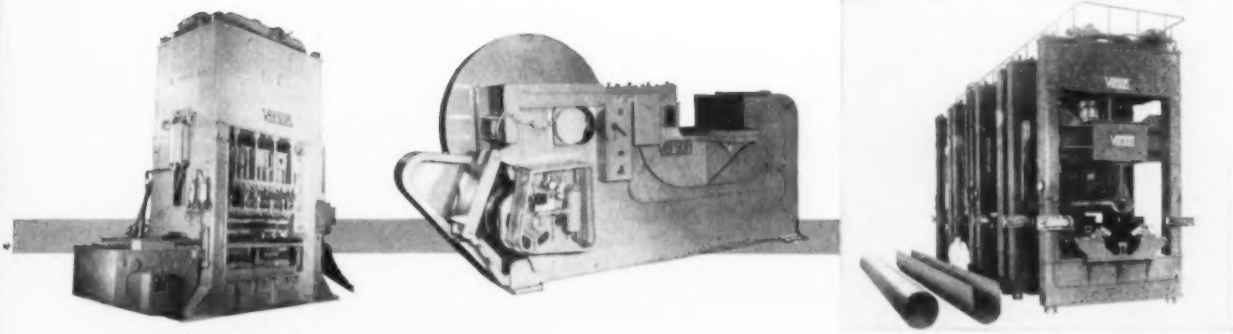

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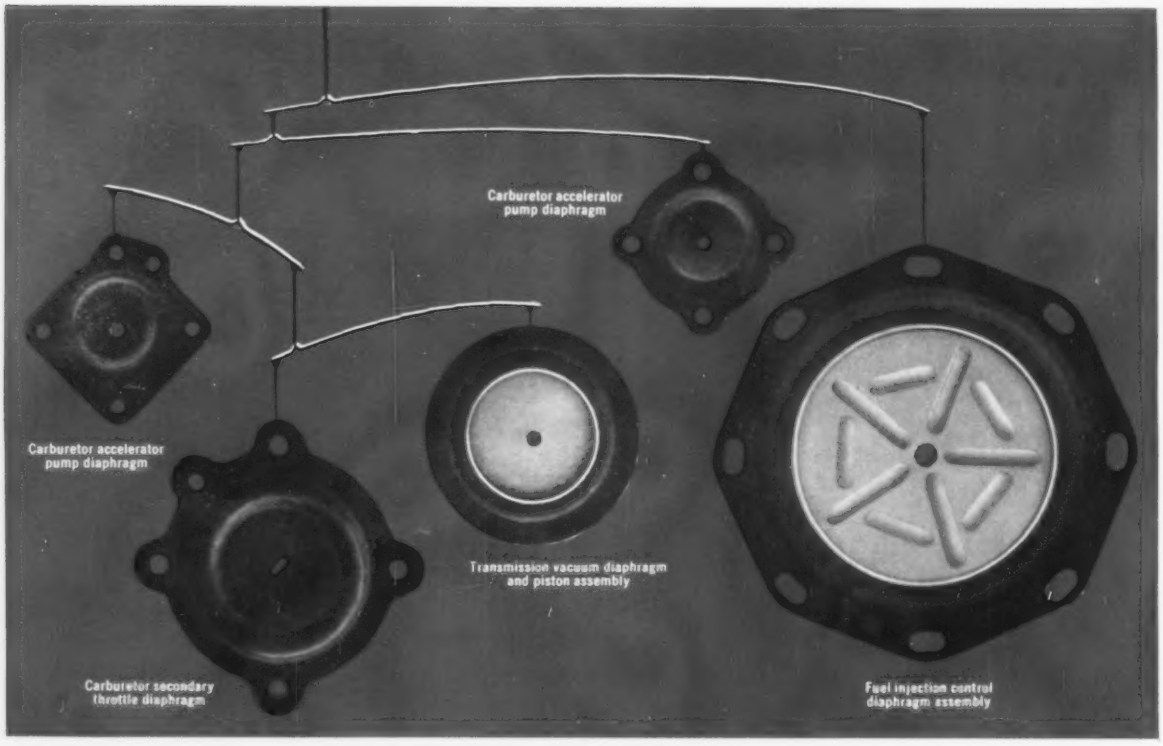
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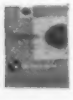

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■ **Better Steelmaking:** No. 3 of a Series

New Process Reduces Iron Ores With Carbon Monoxide

By P. M. Unterweiser—Metallurgical Editor

Here is one direct reduction process that goes a step beyond direct reduction, ends up with a highly useful iron carbide.

Checked out on a pilot plant basis, it lends itself to continuous operation, low capital investment, and a high degree of efficiency.

■ It's fairly certain that direct reduction of iron ores will eventually be adopted by the U. S. steel industry on a production basis. Just when this is likely to happen is anybody's guess. So, too, is the question of which processes are destined for adoption.

For the present, at least, this leaves the field for competing processes hectic and wide-open.

A brand new entry to the field is the Stelling process. Named after its developer, Otto Stelling, professor of industrial chemistry at the Royal Institute of Technology, Sweden, the process uses carbon monoxide as the reducing agent. Some indication of its commercial feasibility can be gained from the news that Sweden's Stora Kopparberg Bergslags, AB. recently exercised its option to license world rights to the process for its own use.

An Extra Step — Possibly the most significant feature of the Stelling process is that it goes one step beyond direct reduction. For in reducing ores, it also diffuses enough carbon into the iron to produce cementite (an iron-carbide). The cementite, in turn, can be readily incorporated in a continuous system for the tonnage production of steel.

Here are some other advantages claimed for the process: 1) It operates at a fairly low temperature (around 1100° F) with a fluidized ore bed that doesn't tend to stick. 2) The formation of cementite is fast enough to avoid decomposition of the carbon monoxide into carbon dioxide and carbon. 3) It operates at atmospheric pressures with a reducing gas that requires neither

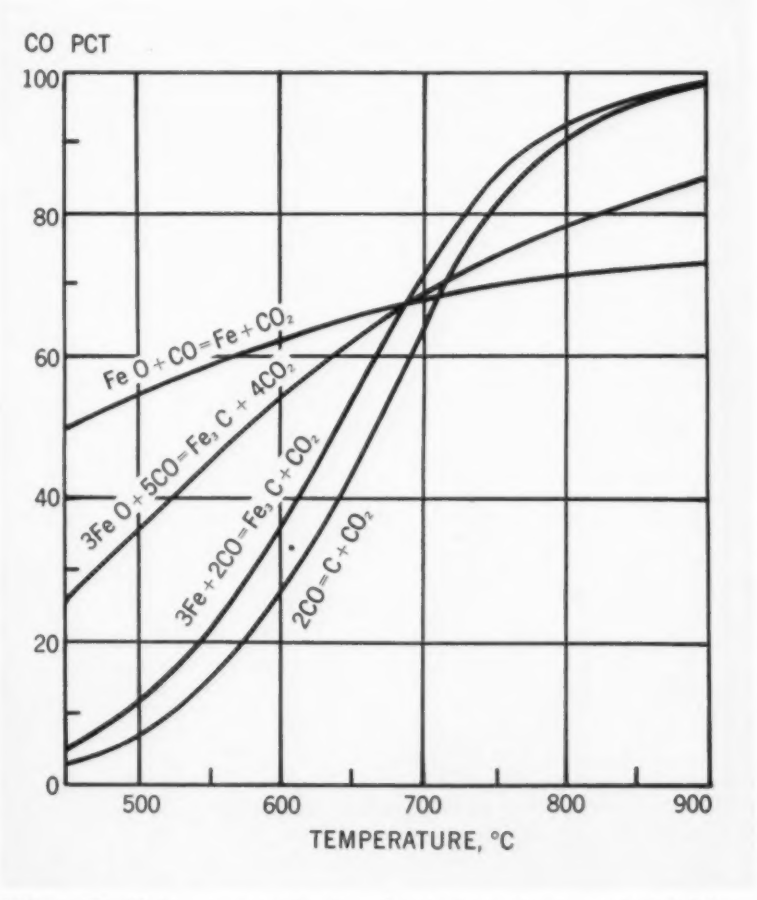


FIG. 1: Equlibrim constants for key chemical reactions as calculated from thermodynamic data.

heating nor cooling. 4) The reducing gas (CO) is relatively easy to produce in large quantities. 5) Its capital investment requirements are modest when compared to certain other direct reduction schemes.

Major Problems — Dr. Stelling began exploring the possibilities of direct reduction about 5 years ago. At that time, reduction of iron ore by means of carbon monoxide in a fluidized bed did not seem commercially feasible. For at so-called ''normal'' temperature (about 1500°F) where reduction is rapid, sticking became a major problem.

At temperatures to slightly above 1300°F the spontaneous decomposition of carbon monoxide was avoided. But, at the same time, these temperatures failed to produce a degree of reduction much above 60 pct because at this content, sticking of the different particles in the bed was still a problem. By introducing horizontal vibrations, reduction could be increased to about 70 pct before sticking.

On The Track—In early tests, it was found that a bed with a 70 pct degree of reduction could be kept fluidized at about 1350°F in a nitrogen atmosphere. But when nitrogen was replaced by carbon monoxide, sticking occurred due to the reaction taking place at the surface of the grains.

One charge with a degree of reduction of 55 pct, treated with carbon monoxide at 1300°F, resulted in a content of metallic iron that actually decreased with an increase in treating time. In one test, metallic iron dropped from 48.5 to 23.2 pct in a 6-hour cycle. The final product was metallic iron transformed into iron carbide.

Useful Carbide — Significantly, the iron carbide remained in a fluidized condition. It was determined that the carbide would remain in this condition at temperatures up to about 1650°F. Fortunately, too, the carbide (cementite) is chemically active and can be further treated in a number of ways. The chemical reactions that can take place in the presence of carbon monoxide are listed in Table 1.

Of particular interest are reactions 3, 4, 5, and 7. Equilibrium constants for these reactions are shown in Fig. 1. Note that reaction No. 3 at temperatures above 1310°F leads to the stable state and results in the production of metallic iron.

Speed Reaction—Comparing reaction Nos. 4 and 7 at about 1100°F, the partial pressure of carbon monoxide at equilibrium for No. 4 is about 50 pct. Under the same conditions, the partial pressure for reaction No. 7 is only 25 pct. These results seem to prove that the speed of the No. 4 reaction is far greater than that of No. 7.

Equilibrium Data For The Reaction Of FeO and CO

1) $3Fe_2O_3 + CO = 2Fe_3O_4 + CO_2$
2) $Fe_3O_4 + CO = 3FeO + CO_2$
3) $FeO + CO = Fe + CO_2$
4) $3FeO + 5CO = Fe_3C + 4CO_2$
5) $3Fe + 2CO = Fe_3C + CO_2$
6) $FeO + Fe_3C = 4Fe + CO$
7) $2CO = C + CO_2$

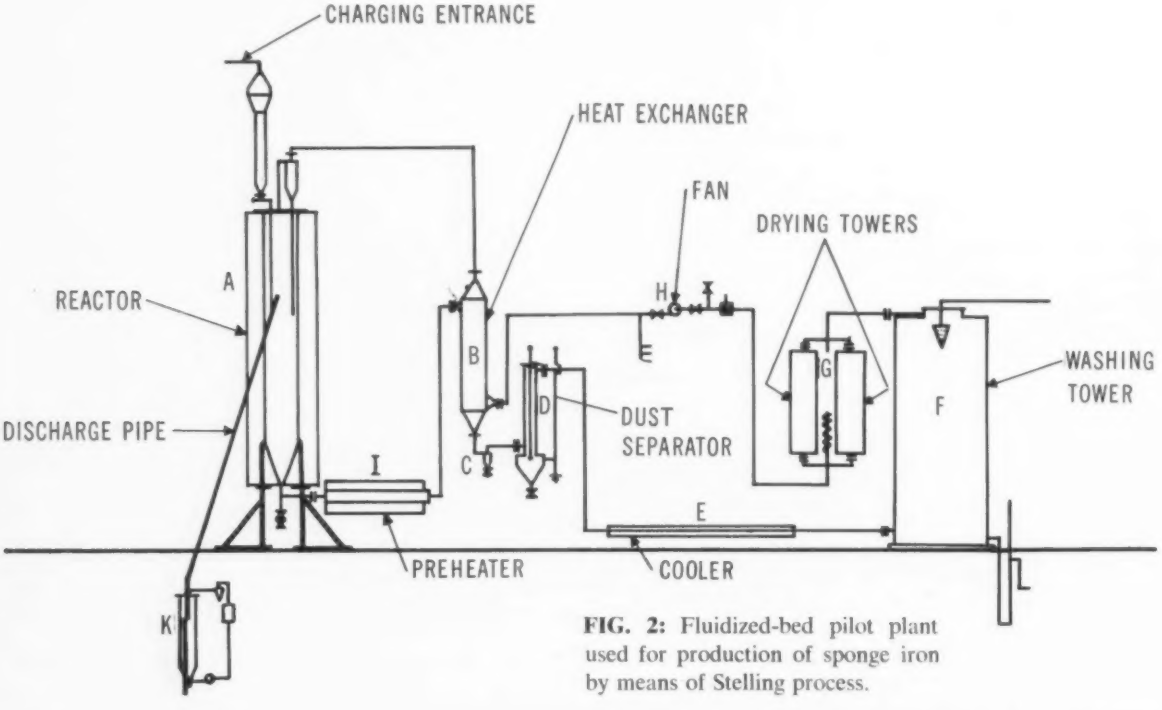


FIG. 2: Fluidized-bed pilot plant used for production of sponge iron by means of Stelling process.

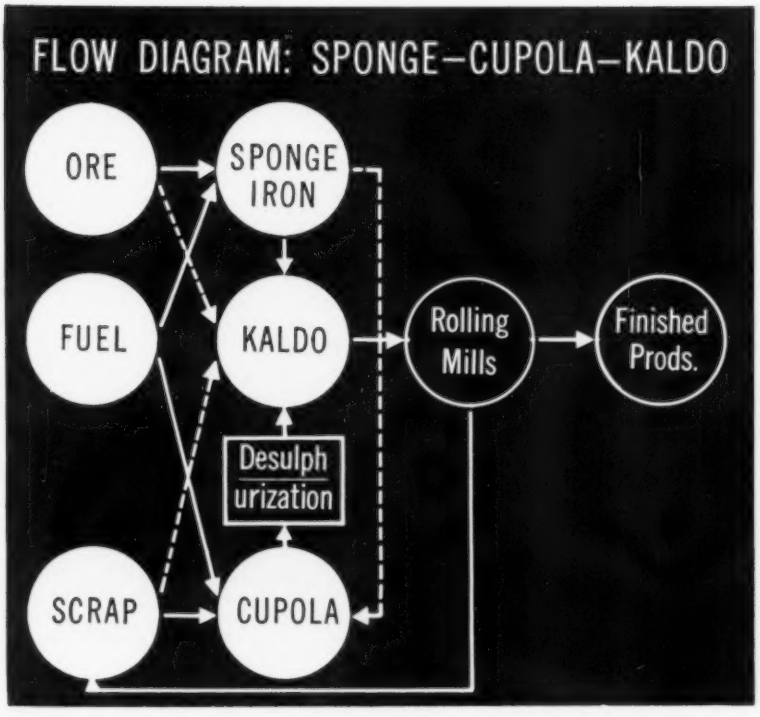


FIG. 3: Here is a suggested arrangement that combines low investment costs per ton of ingot with great flexibility in raw materials. The Kaldo process is an oxygen process that claims a high degree of economy, flexibility of operations, and product quality. The Kaldo furnace can melt ore (up to 20 pct), partly reduced ore (about 30 pct or more, depending on degree of reduction), sponge iron, or scrap (about 40 pct or over). The desulphurizing unit consists of a rotary drum. It makes use of powdered lime in accordance with the Kalling-Domnarvet process. Wiberg-Soderfors sponge and other varieties (such as Stelling carbide) or partly reduced ore can be fed to the cupola as well as scrap.

In fact, the reaction speed is great enough to permit the complete reaction of carbon monoxide and the formation of cementite.

This is a surprising result. Generally, at temperatures just below 1300° F, the reduction of iron ore by carbon monoxide is impossible under ordinary conditions because of the precipitation of carbon. This precipitation results from the breakdown of carbon monoxide into carbon (soot) and carbon dioxide.

Three Key Steps—In practice, the Stelling process involves three separate phases of reaction. In the first, the ore is preheated and further oxidized. In the second, the ore is pre-reduced to about the wustite stage. In the final stage, reduction is continued to produce cementite instead of metallic iron.

The success of the process can be attributed to four basic factors. 1) A fine-grained bed consisting of iron carbide does not tend to stick at temperatures in the range of 1100° to 1200°F. 2) At these temperatures, the speed of reaction No. 4 is far faster than that of reaction No. 7, so that the latter reaction is suppressed. 3) The pre-reduction of Fe_2O_3 to FeO is very rapid; it can be accomplished at about 1500°F without sticking. 4) The oxidation of magnetite can be accomplished in a fluidized bed at temperatures up to at least 1800°F.

Pilot Plant Tested—To determine whether the process would perform successfully in continuous operation, a pilot plant was built. Outlined in Fig. 2, this plant was designed for a capacity of about 100 kg of reduced iron per 24 hours of continuous operation.

The ore is fed to a reactor chamber (a) which is heated by a resistance winding and is adequately insulated. At the conclusion of the cycle, the finished reaction product is discharged to a bed (K) equipped with a cooling mantle. Here, the fluidized material is cooled and discharged through pipes.

The reducing gas is preheated in an electric preheater (I), led out to a heat exchanger (B) through an electrical dust separator (D) and a cooler (E) to a washing tower (F), where the created carbon dioxide is washed away by water.

Free of carbon dioxide, the reducing gas passes through drying towers (G), a fan (H), the heat exchanger (B), to the preheater (I) and back into the reactor chamber.

Advantages Claimed—The pilot plant operation, according to Dr. Stelling, is entirely successful. What's more, it lends itself to conversion to very large scale operations with a relatively limited capital investment. Heat economy is about equal to that obtained with the Wiberg-Soderfors process. The end product (cementite) is resistant to air and does not show any pyroghoric properties.

In Dr. Stelling's opinion, the process has many advantages over straight hydrogen reduction. For one, it operates at atmospheric pressures and does not require heating or cooling cycles for the reducing gas. Hydrogen, says Dr. Stelling, is more complicated to produce than carbon monoxide.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept. The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

High-Pressure Metallurgy: Key

By P. M. Unterweiser—Metallurgical Editor

It is altogether possible that high-pressure metallurgy will pick up where vacuum metallurgy leaves off. It's a tremendous new field with a limitless potential.

Here are a few of the startling results already produced by research into ultra-high pressures.

▪ Down 250 miles beneath the earth's crust, there are alloys of iron and nickel — and possibly other combinations—that no man has ever made, that no terrestial furnace has ever melted.

What makes these materials so very different? One feature, primarily. All of them entered the solid state under tremendous pressures.

True, the materials deep down in the earth may be little more than curiosities. But the conditions under which they were formed are of considerable importance.

Bright Potential — Here's why: melting metals under very high pressures is a lot different than melting them under normal atmospheric pressures—or even under vacuum. The element of high pressure has the potential for producing astounding metallurgical results.

For at higher pressures, many molten or liquid materials undergo changes that can be carried over to the solid state. Such changes can be expected to result in altered physical and mechanical properties. Conceivably, some of these changes

PERFECT DIAMOND: A group of NBS researchers examine the flawless 7-carat diamond (insert) used in studies of the properties of materials at ultra-high pressures. Arrows point to 0.015 in. bore.

To New Alloys?

may be of sufficient magnitude to result in the creation of brand-new materials.

New Phases — Remember that the conventional phase diagrams for the various alloying elements apply, for the most part, to conditions of normal atmospheric pressure. Increase these pressures substantially and entire families of new alloys and new alloy phases may be uncovered. Basically, each of these potentially new materials would still be made up of the conventional alloying elements.

Iron meteorites provide us with some insight into what we may expect in the line of iron-nickel alloys formed under tremendous pressures. While research into the nature of these materials is still rather sparse, it is known that these meteorites contain iron-nickel alloys that differ considerably from those prepared by either conventional or vacuum melting practice.

Taxes Ingenuity—But while the attainment of extraordinary pressures may be routine in the formation of a meteorite, it is obviously the major problem in high-pressure melting of the earthbound variety. Solution of the problem often makes heavy demands on both ingenuity and engineering skill.

One such solution was recently developed at the National Bureau of Standards, Washington, D. C. They have come up with a technique for working with test materials at ultra-high pressures that is at least as unconventional as the field it is designed to probe.

Perfect Diamond—They plan to conduct their experiments in a needle-sized bore that has been drilled through a perfect, 7½ carat diamond. Confiscated from a smuggler by the Bureau of Customs, the diamond will permit testing materials at pressures up to 450,000 psi.

The diamond is a rare and perfect "type 2" stone. Originally emerald - shaped, NBS reseachers modified its contours for their work. It has been flattened on two sides and at the bottom. A 0.015-in. diam. bore was drilled through its center.

A test sample is first located in the bore. Then two tiny, close-fitting pistons of hardened tool steel are inserted, one from each end, with the sample between them. To provide pressure and heat, the assembly is placed in a hydraulic press and is surrounded by an induction heating coil.

Tiny Chamber — The fact that the pressure chamber is tiny has at least one advantage. By applying a weight of about 80 lb, it is possible to develop internal pressures up to about 450,000 psi. Higher pressures would very likely split the diamond.

It is hoped that this basic research into high-pressure phenomena will benefit both the military services and industry. While a number of materials are on the experimental agenda, the first materials to be tested will be quartz and other substances containing silica. The combinations of extraordinary heat and pressure that can be achieved actually simulate conditions that attend an atomic explosion or the launching of a guided missile.

Vital Answers—What materials will withstand such conditions? Says the NBS: upon the answers to questions such as this may depend our national survival. Some of the information gathered may not have an immediate practical application. But such basic research is often the kind that industry needs but cannot afford to compile.

If it were possible, the Bureau's scientists would be only too glad to use nature's own laboratory deep in the earth. There, immense pressures and temperatures are known to exist. Not being able to descend

MINIATURE LAB: Dr. E. N. Bunting of NBS places the large diamond in an infrared spectrophotometer. The diamond will act as a test chamber for determining the response of materials to high pressures and high temperatures.

---

250 miles or so into the earth, they reproduce conditions on a small scale in the laboratory.

New Concepts — In specially constructed equipment, they have developed pressures of more than 60,000 atmospheres. Since an atmosphere is equivalent to 15 psi, this adds up to pressures of about 1 million psi.

Under sufficient pressure, many materials will act—or react—differently. Ice, for example, will melt under pressure. At a pressure of 135,000 psi, water will freeze at room temperature. Raise the pressures even higher, and water will freeze at its boiling point—212°F.

These are some of the startling results already derived from research in ultra-high pressures. High-pressure metallurgy may be expected to produce equally surprising results. It may very well revolutionize many of our current concepts of metals.

Stress Relief of Weld Layers Assures Quality Repair

What's often so costly about the failure of a large casting is the downtime involved.

It's all the more so when spare castings aren't available.

But often the possibility of repair is overlooked. A successful method is alternate arc welding and stress relief.

■ Successful repair of a 5-ton crankshaft points to the practicality of cyclic arc welding, alternate welding and stress relieving to insure a quality weld.

Broken in service, the shaft is part of a 13½-cu yd dragline power shovel at the Sunnyhill Coal Co. strip mine, New Lexington, O. At the time the shaft failed, there was only one spare shaft on hand for seven similar shovels. A second failure would have meant a production loss of 6 months to replace castings.

Repair or Replace?—In addition to the threat of costly downtime, having a new 24-in. diam shaft made would cost $8000. It led to the choice of going ahead with repair.

In far less time, Maintenance Engineering Corp., Pittsburgh, repaired two broken shafts by the cyclic arc welding method. The repair cost of $1500 each is less than 20 pct of the investment in a new casting.

Under development for the past 5 years, the welding technique applies to the quick restoration of a variety of heavy machinery components, such as shear housings, upsetter crankshafts, steel mill pinions and rolls, and hydraulic press cylinders.

The repaired shaft is a cored steel casting with 0.25 pct carbon. The wall thickness at the break was 4 to 5 in.

Here's the Cycle—Preheat temperatures for the arc welding range from 500° to 1000°F. After certain phases of weld deposit, a stress relieving cycle at 1150°F prevents accumulation of residual stresses which might cause cracking.

After each stress relief, the temperature is lowered to the welding range and further metal deposited. There's a fairly definite range of metal thickness which can be laid down before danger of cracking occurs.

Portable furnaces, fired with a mixture of charcoal and coke under air pressure, serve for the stress relieving and preheating. In repairing such parts as rectangular mill housings, two or more furnaces may be grouped to eliminate residual stresses in areas beyond the fracture.

The procedure includes magnaflux particle testing before and after each stress relief to check for internal fractures. Where weld deposit is carried beyond the safe thickness, fractures progress only to the previous stress relief. Thus, it's possible to remove and reweld defective material with full control of quality as weld builds up.

Prefer Arc Method—Many repairs of this nature have been made

COMPLETE FRACTURE: It would take 6 months to replace this casting. But repair by welding took far less time at 20 pct replacement cost.

by thermit welding. However, Maintenance Engineering engineers find that arc welding improves both maximum ultimate strength and ductility.

Deposits can be laid in volume without large shrinkage cavities, gas pockets, or piping on inside of the weld. It's made possible by the combination of preheat, stress relief, and the annealing effect of successive layers.

There's a wide range of welding electrodes available with up to 120,000 psi tensile and 30 pct elongation in 2 in. To control distortion it takes careful preparation of the fractured edges, and regulation of the stress relieving treatment.

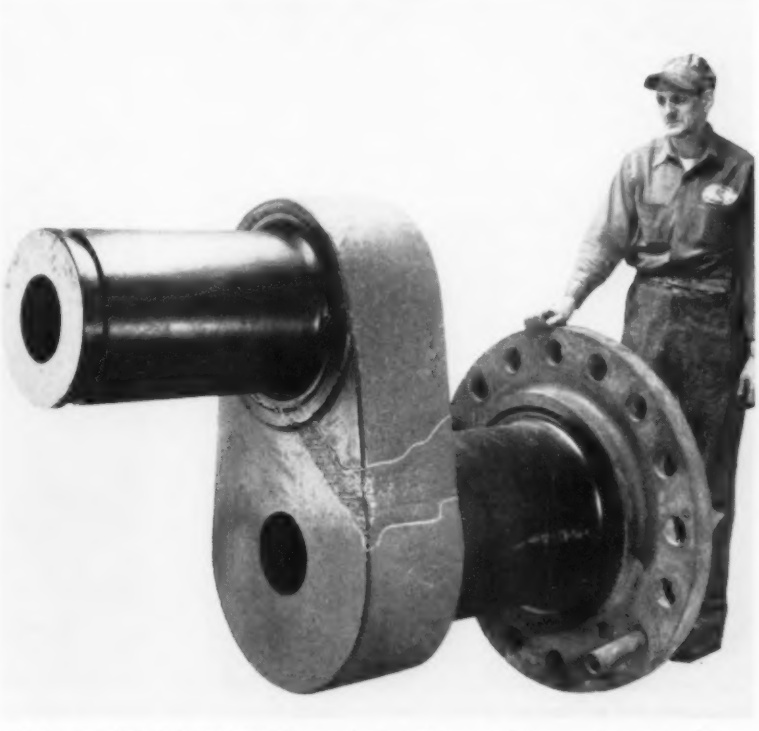
Gets Precise Alignment—In preparing the crankshaft joint, the fracture was flame-scarfed to leave "pillars" of parent metal along the mating edges. By this method, it was possible to hold alignment to 0.015 in., well within operating tolerances.

A substantial weld was then deposited in the prepared sections between the pillars. After stress relieving, the pillars were scarfed out and welding continued. The finished weld was hand dressed by grinding, eliminating any need for machining.

Of the 350 lb of weld metal deposited, about 60 pct was done manually with Lincoln Electric LH-70 rod in 3/16 and ¼-in. sizes. This is a low hydrogen, heavily-coated electrode, meeting AWS specifications E-6016, E-6015, E-7015, and E-7016. After stress relieving, Tensile strength ranges from 70,000 to 75,000 psi.

The balance of filler metal was deposited by semi-automatic welding, with Lincoln ML-2 "Squirt" welding equipment. Lincoln L-60 mild steel wire was used with No. 840 neutral agglomerated flux. A 500-ampere combination ac/dc welder supplied the current. The complete job required about 150 man-hours of welding and stress relieving.

SCARFING DUE HERE: By scarfing the broken edges and leaving "pillars", it's possible to match parts accurately for first weld deposit.



READY FOR DUTY: Weld required 350 lb of filler metal, with 60 pct deposited manually, the rest by semi-automatic welding.

Metal Fibers Extend Life And Uses of Plastic Tooling

Plastic tools for metal forming have a new look. They're being reinforced with metal and glass fibers.

As a result, these low-cost, lightweight, easy-to-make tools are capable of handling longer press runs than ever before.

▪ Plastic tools for metal forming presses, once limited to prototype and low-production jobs, are edging into medium production-run areas.

The reason is plain to see: these tools and the techniques for making them are getting better right along. One of the latest ideas is to reinforce the cast bulk of an epoxy resin tool with metal or glass fibers. Then, to make it still better, an epoxy metal-fiber-flock coat is applied to the outer surfaces.

One punch and die set made in this manner stamped upwards of 130,000 auto radiator-tank tops out of 0.025-in. thick brass. The run was completed without any time out for tooling repairs or maintenance.

Extend Plastics Benefits — The punch and die used on this job were made from one of two new plastic-metal compositions just announced by the Bakelite Co., a division of Union Carbide Corp. Calling them Epoxy-Alloys, the firm says they can extend the advantages of present plastic tooling materials (low cost, shorter tooling-up time, light weight) into a broad new range of tool and die applications. For example:

1. Prototype or development dies for deep drawing heavy metals, or making large, compound-contour stampings out of stainless steel up to ¼-in. thick.

2. Low-production draw dies for runs of 1000 to 10,000 stampings, which can be used without metal rings or inserts.

3. Medium-production draw dies

FOR MEDIUM-HIGH RUNS: Plastic tooling reinforced and surfaced with metal fibers produced more than 130,000 auto radiator-tank tops from 0.025-in. thick brass sheet (left). Die in foreground (right) proved to hold up remarkably well, produced parts within tolerance to the end of the full year's run.

for runs of 10,000 to 50,000 stampings, in which plastic-metal punches and pads are used with metal inserts, draw rings and blank holders.

4. Medium-high-production draw dies for runs of 50,000 to 150,000 or more stampings out of thinner, easy-forming metals, such as the 0.025-in. thick brass mentioned above.

5. Flanging, trimming, restrike and secondary operation dies. Here the new plastic-metal materials are said to offer superior machinability and toughness, plus the ability to retain and support dowels, screws, and steel cutting edges.

6. Hydroforming and rubber pad forming dies, where Epoxy-Alloys not only provide mass castability and abrasion resistance, but also minimize scratching of metals such as soft aluminum and stainless steel.

7. Stretch dies for forming difficult, sharp radii, and hot stretch forming dies where present plastic materials may be of marginal value.

8. Fixtures and gages where mass casts are needed for rigidity, or where better resistance to heat and abrasion is required.

Two Types Differ — The two Epoxy-Alloys developed for the foregoing list of applications differ in that one has its mass-cast body reinforced with steel fibers; the other uses glass fiber reinforcement. Both types, however, are surfaced with an epoxy steel-fiber-flocked face coat.

Fiber - reinforced - and - flocked tools are said to have greatly increased thermal conductivity, high resistance to both heat and thermal shock, and high impact strength and rigidity. They machine easily, can be made magnetic, and can be heated by induction or resistance. The homogeneous, mass-cast tools overcome shrinkage and brittleness problems, and they can be repaired easily by a plug technique.

About 70 dies made from these materials have been in commercial use. Thirty-five were built for a military project in 15 weeks, and at a cost of $250,000. Conventional metal tooling would have taken an estimated 18 months to produce, and at a cost of $2 million.

SHORT-ORDER TOOLING: Made in just five weeks, these plastic-metal inserts redrew 65,000 refrigerator panels without showing wear.

Redraw Large Panels — Epoxy-Alloy inserts in a pair of redraw dies have also formed more than 65,000 refrigerator panels from 0.035-in. thick steel. These tools were made in just five weeks, half the time estimated for conventional steel dies. No repairs have been needed to date, and the contoured inserts remain virtually unchanged.

Bakelite has developed still a third type of plastic-metal tooling material. Reinforced and surfaced with aluminum fibers for maximum thermal conductivity, it's said to be excellent for making: (1) precision metal casting molds, (2) heat matched molds (for low pressure use), (3) vacuum forming molds, (4) slush molds, (5) foundry patterns for green sand castings.

In the case of foundry patterns, the material performs without the condensation and sand-drag problems associated with recirculating hot sand. In fact, one pattern for rocker arms has produced over 100,000 molds to date.

THE "AERODER": Tests high temperature properties of materials in its 2200-2500°F, 4000-fps exhaust.

PART II

What We Need in High Temperature Materials

By **A. J. Carah**—Asst. Missiles Design Engineer, Douglas Aircraft Co., Inc., Santa Monica, Calif.

Aircraft and missile structures may soon have to operate at temperatures of 1500-2100 F. And powerplant elements will have to resist even more heat.

This will call for new materials and new ways to fabricate and join them.

Development progress is too slow, considering our already urgent needs.

■ To be efficient, steel airframe structures require thin sections sufficiently stabilized to prevent buckling at low stresses. Thin panels separated by a honeycomb core are very efficient; they also have smoother aerodynamic surfaces than skin-and-stiffener structures.

Extensive use is now made of paper and aluminum cores resin bonded to steel surface sheets. But these are limited to the 250-500°F range wherein the resin bond breaks down. Bonding agents which are more temperature-stable are urgently needed.

Brazing and resistance welding have been used to bond honeycomb cores to sheets, but neither method is out of the laboratory. Resistance welding is currently limited to sheet thicknesses not over four times the thickness of the core members, a ratio which is inefficient and impractical for most structures. A ratio of 10-25:1 must be achieved.

Brazing is Problem—Brazing can produce the desired skin-to-core thickness ratio, but it involves other problems. It must be done in a dry hydrogen atmosphere, an expensive and hazardous job at best. Experimental single curved panels have been made, but even flat panels in small sizes are difficult and costly to produce; recent bids on some

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Part I of this two-part article, which covered our need for better ferrous and nonferrous alloys, appeared in last week's issue, p. 75.

10 x 30-in. panels less than an inch thick ranged from $300 to $750 per sq ft.

Tests of some small, brazed, honeycomb fin panels also turned up two problems aside from cost. One was inadequate local bond strength in tension and shear. The other was the difficulty of attaching the panels to each other and to other structures; the thin sheet metal edges present a tolerance problem and solid members are too heavy.

But because honeycomb structures hold much promise for high temperature use, a vigorous attack on present bonding, joining and cost handicaps is warranted. The need is now.

Fiber Glass Shows Promise — Plastic impregnated fiber glass materials also show considerable promise for use in lightweight, temperature resistant structures. One reason is that such structures can have very favorable strength-weight ratios compared to conventional metal types. Another is that, even though present materials of this type lose strength rapidly above 800°F, the laminate is an excellent thermal insulator. Thus, for transient heating in particular, the inner layers of material work at much lower temperatures than the surface layers.

Several approaches show promise of preventing oxidation, erosion or de-lamination of the high temperature outer surface: (1) using flame sprayed or dipped and baked ceramic coatings, (2) applying thin layers of oxidation resistant metal, (3) using end grain fiber glass for the outer layer, (4) making sandwiches which allow the outer layer to burn off while the inner one carries the load.

Troubles With Ceramics—However, there are fabricating problems with all of these methods. For example, ceramic coatings are generally brittle; thermal shock causes impact damage and spalling. Adhesion is poor, and differences in thermal expansion coefficients may cause loss of adhesion.

Ceramic coatings also tend to be nonuniform, which causes hot spots. And curing temperatures for uniformly dipped coatings are usually too high for the underlying material. Flame spraying of ceramics is costly and time consuming. Sand blasting the base material for good adhesion often causes excessive warping.

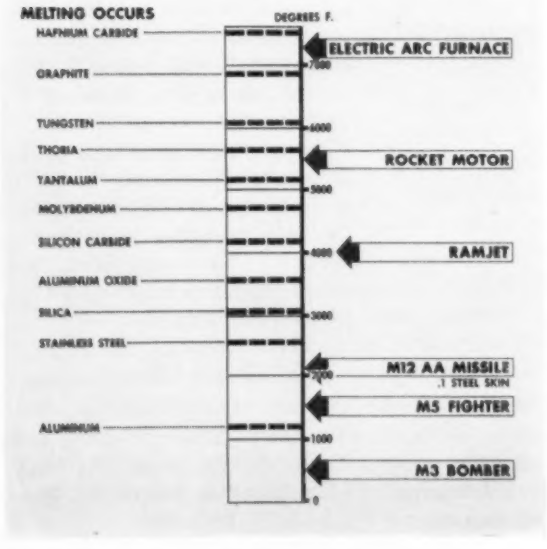
High temperature metals used as outer layers on fiber glass structures are difficult to roll into thin sheets. As a rule, also, they are rich in critical materials and quite expensive. Forming these thin gages is a problem, as is joining them. The question of adhesion to the base material has not been explored. The use of flame sprayed metal may be feasible, but Douglas does not know of any such tests.

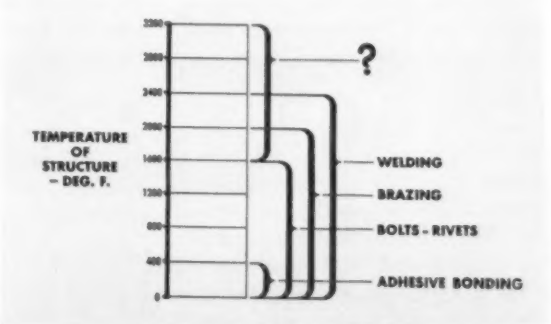
Fibers On End—End grain glass fibers embedded in resin show very high temperature and erosion resistance. But all samples tested have been hand made; there is no production technique for making the material.

Fortunately, fiber glass - resin sandwiches are simple to make, although curved shapes need expensive tooling. But the concept of sacrificing the outer layer must await flight testing.

For aircraft use where structure life is a factor, the inner layer may be considered as the load carrying element while the outer layer and honeycomb serve as insulation. This application does not sacrifice the outer layer of material, and it may, despite the added weight involved, be feasible for missiles.

Hits Alloy Supply — Extensive use of rich alloys of the cobalt or nickel type may be economically feasible for long-life aircraft and engines, but this may strain the limited supply. It is hard to justify using such materials in one-shot





WILL JOINTS HOLD?: The effectiveness of conventional joining methods (above) seems a bit short of future missile and aircraft needs.

HOW THINGS STAND: Known materials (left) may not melt at service temperatures, but that's small comfort if they can't be fabricated.

Missile and Aircraft Materials Must Be . . .

1. **More creep resistant and stronger at high temperatures.**
2. **More resistant to oxidation and erosion.**
3. **More easily formed, machined and joined.**
4. **Leaner in critical alloying ingredients.**
5. **In plentiful supply for mass production needs.**
6. **Developed with better high-temperature test facilities.**

missiles unless there is no other way to do the job.

Moreover, such materials are hard to form and machine. With some, the only answers are either investment casting to final shape, or grinding. And it's improbable that a thin metal structure of any size can be made by the investment casting process.

What about ceramics for high temperature use? Many of them have melting points well above 3000°F. These compounds are mostly metallic oxides, carbides, nitrides, borides or silicides.

The oxides will not oxidize, it's true, but they are generally brittle and subject to thermal shock. The carbides, nitrides and borides have relatively good mechanical properties but are subject to oxidation. We must find a compromise between good mechanical properties and chemical inertness for high temperature atmospheric exposure.

Cermets The Answer? — This compromise may be found in the cermets. These are sintered compounds of oxidation resistant ceramics and metals, such as chromium. There has been some promising development work, but much remains to be done, especially on fabricating and joining techniques for structures of any size.

One high temperature problem requiring immediate solution is the development of a suitable radome having reasonable electrical transparency and mechanical strength, which can also be made at low cost. We have not been able to make one in a practical size. But research is underway. It may teach us how to use ceramics or cermets for larger structures.

Needs Giant Squeeze — In such structures, one of the big questions is how to attach ceramic components to each other, or to metallic materials. Another involves the best way to form them, since high compacting pressures are needed and large parts mean enormous loads.

Also, parts such as radomes call for very close thickness tolerances. These cannot be achieved at present due to mold distortion under pressure and warpage in firing. Thus, parts must be made oversize and brought down to finished dimensions, a tough problem with ultra hard ceramics. Diamond grinding or chemical etching may have the answers, but much work remains to be done.

How To Test?—The performance of potential high temperature materials must be checked out under actual or simulated-use conditions. And although it has been argued that it is cheaper to make some airframes and fly them to their design conditions than it is to furnish the necessary power to simulate these conditions, this method leaves much to be desired.

For one thing, visual observation of behavior in flight is difficult if not impossible. Telemetered data is usually limited in quantity and not as reliable as data read directly from instruments, Then, too, parts tested to failure in flight are usually either so damaged by impact as to camouflage the initial failure, or are not recovered at all.

Not all environmental conditions occurring in high temperature flight can be simulated on the ground. But progress in developing high temperature structures would be more rapid if such test facilities were available.

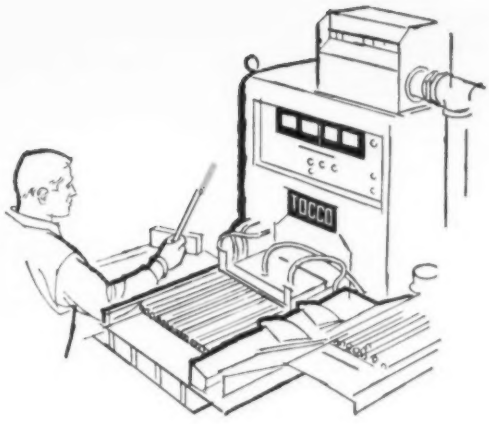
New Ways To Join — Conventional joining methods have probable limitations, too. However, brazing, welding, riveting and bolting will probably be satisfactory for most of the metallic materials, possibly excepting the rich alloys working at very high temperatures.

But joining ceramics or ceramic coated materials is another question, because of the chipping that occurs when holes are drilled or bolts are tightened. A new approach seems to be needed. It may be in the direction of a welding technique for ceramics, or in the design of massive parts without joints, if this is possible.

Parts Must Move—A brief mention of cooling and lubrication problems in high temperature vehicles is in order. It may well prove more economical to cool missile structures than to carry along enough structural material to serve as a heat sink. If so, porous, sintered materials may be required. But sintered metal parts in the sizes needed are a real manufacturing problem by today's standards.

As for lubricants, ever higher temperature resistance will be needed; also, low friction bearings that will run dry without seizing. Without such developments, high temperature structures cannot fulfill their functions.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept. The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.



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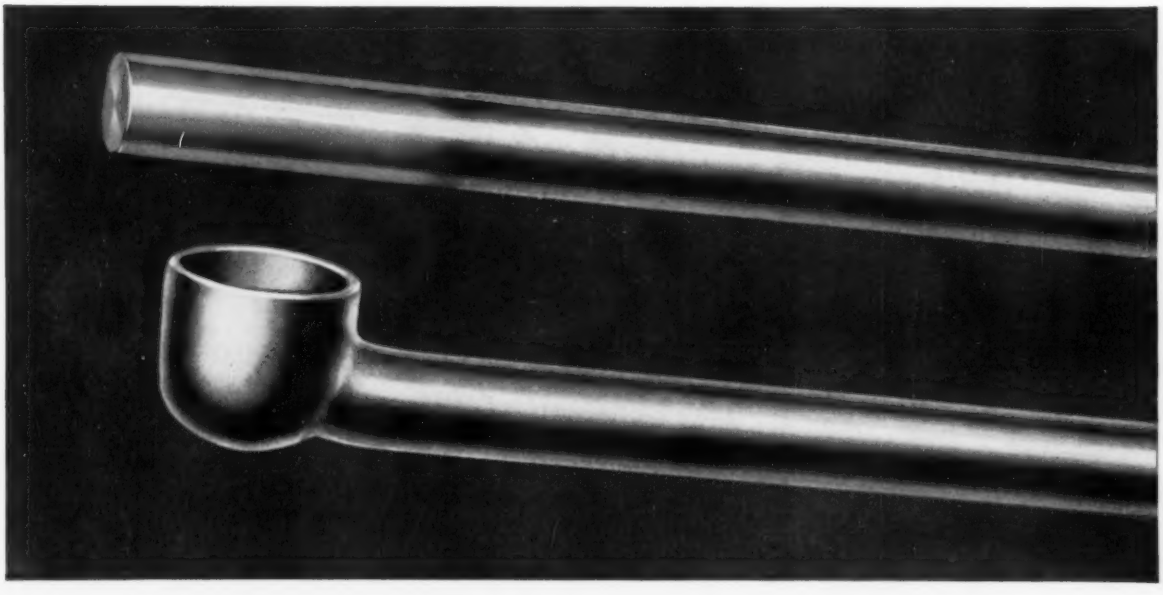

Engineers at Thompson Products Inc.'s Michigan Division recently changed from gas-fired furnaces to fully automatic TOCCO. Application: heating for forging of automotive tie rods. Result: a substantial reduction in direct labor costs, saving thousands of dollars a year on this heating for forging operation. *Annual savings actually amortize the cost of the TOCCO installation in about one year.*

The automotive tie rod shown here is only one of over 500 parts heated for forging in Thompson's new, modern forge plant. *Every one of these parts is heated with TOCCO equipment.*

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FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 111.

Tool Steel

In the market for precision ground tool steel? If so, a new stock chart tells what's available from one supplier. It gives sizes, other data on air-hardening (SAE A2) and oil-hardening (SAE 01) types. (Uddeholm Co. of America, Inc.)

For free copy circle No. 1 on postcard, p. 111

Wheel Dresser

Informative literature introduces a new diamond dressing tool. This tool employs a pair of dressing devices in tandem. The two contact points reduce pressure, heat, friction on the diamond. Thus, tools last longer, give better results. (Tandemite.)

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Shovel Crane

Self-propelled, a new shovel crane is featured in a 16-page catalog. The 3/8-yd, 7-ton unit is short-coupled, of square design. It has rubber tires, 4-wheel drive; 4-wheel steer is also available. (Thew Shovel Co.)

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Limit Switch

Downtime of production lines for replacement of limit switches can now be practically eliminated. So states a bulletin describing a precision limit switch which can be replaced in seconds with little effort. (Micro Switch Div., Minneapolis-Honeywell Regulator Co.)

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Spiral Drill Points

The new spiral point concept in drill point geometry and the drill sharpener for applying it to standard twist drills are illustrated in a 16-page brochure. (Cincinnati Lathe and Tool Co.)

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Furnaces

Laboratory and industrial thermal equipment is described in a 20-page catalog. It includes data on electric furnaces, hot plates, temperature controllers, pyrometers, flask heaters and magnetic stirring hot plates. (Thermo Electric Mfg. Co.)

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Deaerators

Tray type deaerators that remove corrosive gases from boiler feed water are described in a bulletin. They come in effluent capacities from 18,000 to more than 2-million lb/hr. (Allis-Chalmers Mfg. Co.)

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Welding

In its dozen pages a booklet shows how to make a quality root pass with a consumable insert when welding from one side. It covers 15 different insert compositions for welding carbon steels, austenitic stainless, nonferrous alloys, and

chrome-moly and chrome steels. It's a development of General Dynamic's Electric Boat Co. (Arcos Corp.)
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Tracer Millers

Tracer-controlled sculpture machines are described in a 4-page bulletin. The machines perform tracer-controlled countour and profile milling in a wide range of metals. Speeds are infinitely variable. (Colonial-Romulus Div., Colonial Broach & Machine Co.)
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Thermal Wells

Wells for thermostat applications in fluids, gases, or high pressure environments are featured in a catalog. It describes copper and stainless steel designs suitable both for immersion and surface mounting. (Fenwal Inc.)
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Press Modernization

Modernization and conversion assemblies for older, obsolete or worn straight side and gap presses are discussed in a 16-page bulletin. It gives 18 examples of how factory-engineered, plant-installed kits add to an older press many modern features. (E. W. Bliss Co.)
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Corrosion-Proofing

How a corrosion-proofing materials manufacturer also offers his own experienced construction and installation services is explained in a bulletin. Split responsibility between manufacturer and constructor is no longer necessary; the entire job can now be completed with one source of responsibility. (Atlas Mineral Products Co.)
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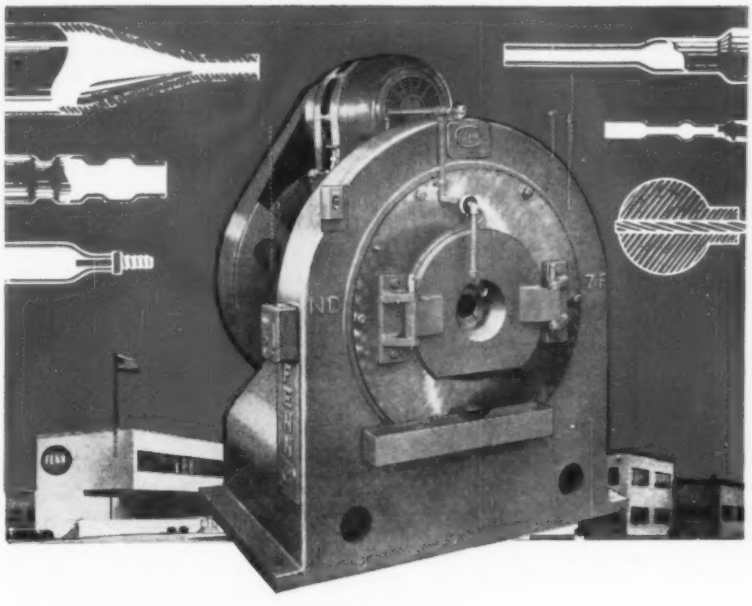
Dust, Fume Removers

New wet type gas scrubbing systems are covered in an applications bulletin. These systems remove dust, fumes and mist during various indus-



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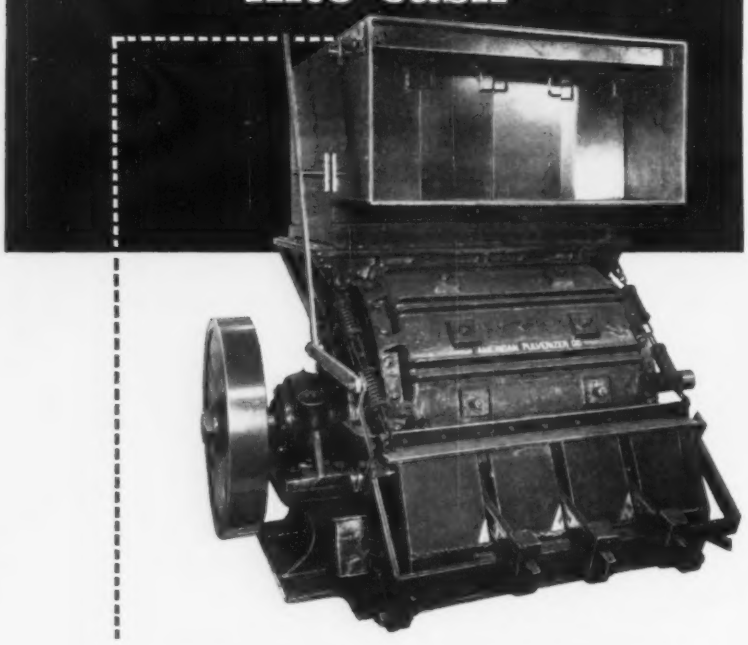

Long, curly, troublesome metal turnings, reduced in an American Metal Turnings Crusher, can produce additional profits for your plant.

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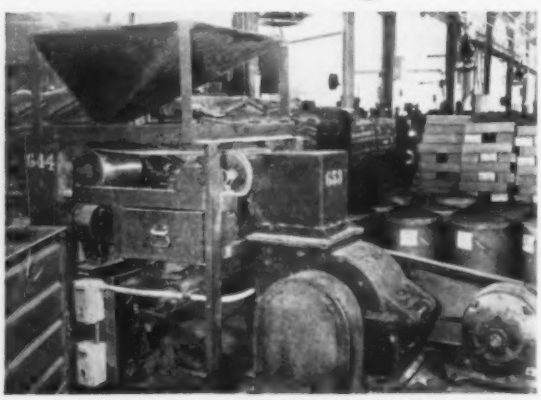

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FREE LITERATURE

trial processes. Two models handle: (1) micron in size and larger; (2) submicron particles. They range from 500 to 20,000-cfm capacities. (Process Equipment Div., Automotive Rubber Co., Inc.)

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Creep Tester

Temperature control equipment for stress-rupture and creep testing is covered in a data sheet. It deals with a control which holds specimen temperatures within ± 1°F. (Leeds & Northrup Co.)

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Drilling Machines

Retaining all the rugged, easy-operating and long-life features of earlier models, a new line of drilling machines, tappers and accessories boast many new refinements. So states a bulletin which describes the drilling equipment. (Buffalo Forge Co.)

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Height Gage

A folder explains functions of a new height gage. This gage has transparent window scales. It reads easily, in fractions of 1/1000 in. (George Scherr Co.)

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Metal Powder

Using a powdered metal process can cut your costs in making precision parts. A 16-page pamphlet tells how. (Reese Metal Products Corp.)

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Pallet Trucks

Handling equipment for use in narrow aisles is outlined briefly in a data sheet. It shows hand trucks, electric tiering trucks, a 2000-lb capacity pallet truck, and a 4000-lb electric walkie truck. (The Raymond Corp.)

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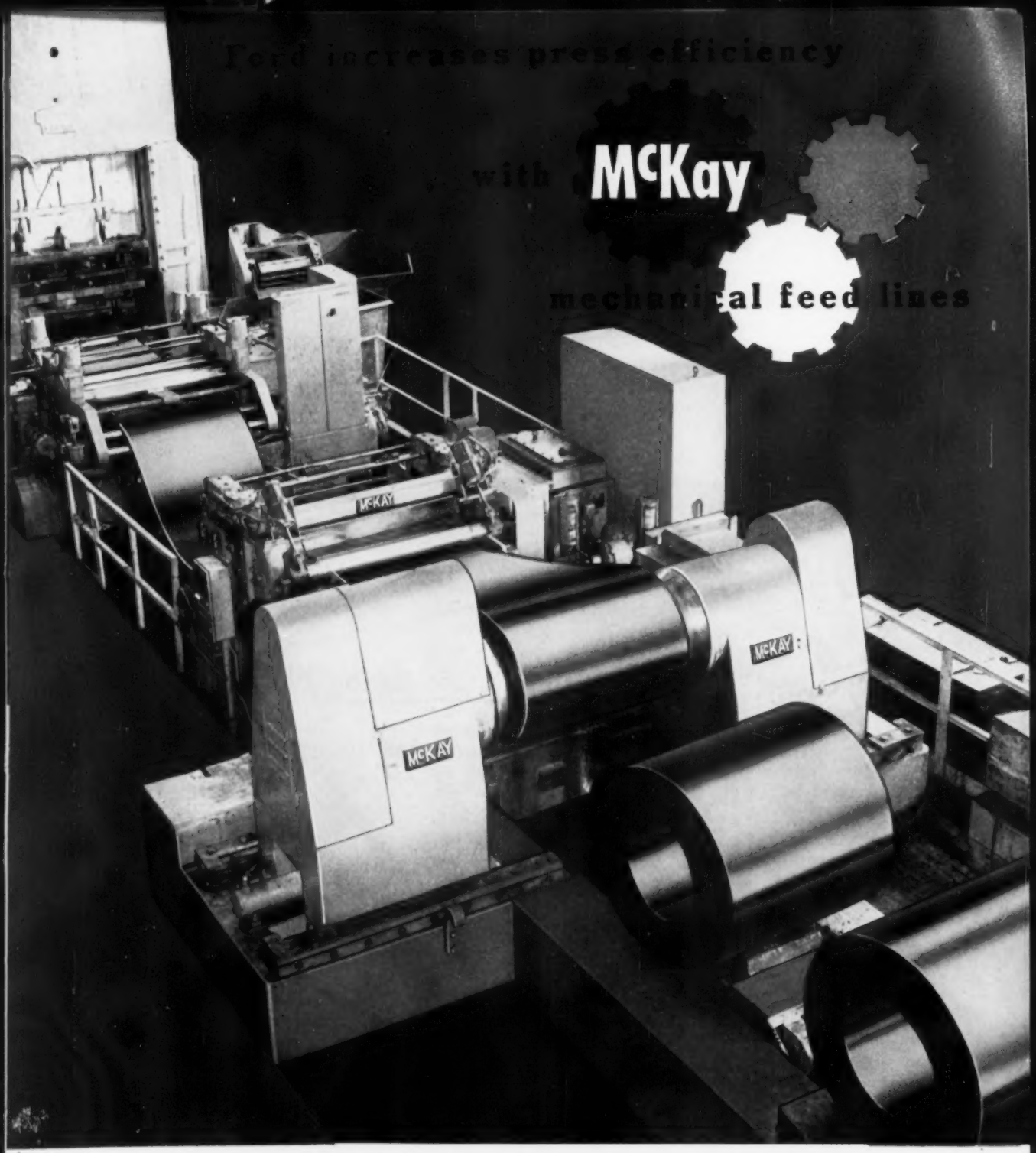

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Worm Gear Drives

Extensive design and application data of double-enveloping worm gearing is presented in a 24-page bulletin. (Cone-Drive Gears Div., Michigan Tool Co.)

For free copy circle No. 21 on postcard

Flame-cutting

Flame-cutting nozzles made by one firm are reliable because workmanship that goes into them are reliable. That's the attitude of one large manufacturer of flame cutters. A 12-page leaflet delves into production steps that contribute to this quality. (Linde Co.)

For free copy circle No. 22 on postcard

Thermostat Metals

Corrosion-resistant thermostat metals are discussed in a 4-page folder. It summarizes test results on various metals exposed to corrosive environments (highly humid atmospheres, hot water, salt spray, etc.) The bulletin describes the material as observed in actual application. (General Plate Div., Metals & Controls Corp.)

For free copy circle No. 23 on postcard

Materials Handling

Just off the press is a 16-page product bulletin of a long-established materials handling equipment maker. For free copy, write on company letterhead to Merrill Bros., Caspian Street, Maspeth, N. Y.

Metal Gaskets

Spiral wound metal gaskets are covered in a bulletin. It details outstanding features and design factors of the metal gaskets as well as the types available for specific applications. (Garlock Packing Co.)

For free copy circle No. 25 on postcard

Fast-acting Valves

Quick-acting shutoff valves for air, water, gas or oil service are announced in a new bulletin. Made in ⅜, ½, and ¾-in. sizes, the valves are for use on pressures up to 150 lb at temperatures up to 250°F. (Homestead Valve Mfg. Co.)

For free copy circle No. 26 on postcard

Toolholder

Included in a firm's 104-page catalog is a new heavy-duty quick-change toolholder. It describes the holder as especially suited to heavy cutting in die sinking and similar operations. (Universal Engineering Co.)

For free copy circle No. 27 on postcard

Rail Car Dumper

A new rotary car dumper handles hopper and gondola cars. It employs two clamps which hold the car secure without the use of counterweights. Such is its balance that it can dump and return a spotted car in one minute with only 30-hp drive. A 16-page booklet illustrates it. (Heyl & Patterson, Inc.)

For free copy circle No. 28 on postcard

Electrical Equipment

A 12-page booklet discusses specialized drives and motors engineered and built to tough industrial and government specifications. (Reliance Electric and Engineering Co.)

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Sealed-gear Pump

Sealed gear pumps for mounting on any machine which requires fluid circulation are described in a technical reference. It covers two models: one in which fluid flow reverses when shaft rotation re-

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FREE LITERATURE

verses; and another in which fluid flow is always in the same direction regardless of shaft rotation. (Bijur Lubricating Corp.)

For free copy circle No. 30 on postcard

Screw Fastener

A screw that fits flush in standard counterbored holes and is wrenched externally with standard wrenches is presented in a 4-page folder. (Ferry Cap & Set Screw Co.)

For free copy circle No. 31 on postcard

Tractor Maintenance

Properly reconditioning worn or damaged parts can add many service hours to their life. A rebuilt part often lasts as long or longer than when it was originally installed. So points out a tractor manufacturer in its 8-page booklet. (Caterpillar Tractor Co.)

For free copy circle No. 32 on postcard

Carbide Surfacing

Tungsten carbide surfacing is discussed in a 4-page bulletin. It describes a new product for protecting metal parts against abrasion and wear. (Kennametal, Inc.)

For free copy circle No. 33 on postcard

Castings

One Foundry's patented alloyed gray iron is discussed in a data sheet. Production methods, engineering data, and case histories are included. The data sheet highlights cupola control techniques used in producing this high alloy, high strength gray iron. (Advance Foundry Co.)

For free copy circle No. 34 on postcard

Filters

Design, construction and operating data on new cone type filters describes how this equipment discharges dewatered, granular materials at constant moisture content regardless of moisture in the feed. The loose textured nature of the discharged material makes it ideal for more economical and faster final drying. (Carpco Mfg., Inc.)

For free copy circle No. 35 on postcard

Ultrasonic Welding

Ultrasonic welding without fusion is discussed in 4-page brochure. (Sonobond Corp.)

For free copy circle No. 36 on postcard

Tapping Machine

A data sheet gives a rundown on a multiple pitch automatic lead screw tapping machine. This unit performs automatic tapping of all standard threads 32 through 80 using one lead screw. (Milman Engineering Co.)

For free copy circle No. 37 on postcard

Surface Grinding

Surface grinding wheels in a wide range of standard types and sizes, available from stock, are covered in a 4-page bulletin. A portion of the bulletin also offers practical grinding suggestions. (Simonds Worden White Co.)

For free copy circle No. 38 on postcard

Welded Pipe

Welded steel pipe for industrial uses is discussed in an 8-page publication. Pipe diameters range from 6 to 36 in.; wall thicknesses 9/64 to ½ in. (Armco Drainage & Metal Products, Inc.)

For free copy circle No. 39 on postcard

Plating Barrel

How a belt-driven barrel plating cylinder can cut costs is explained in a data sheet. The belt drive allows total submersion of the barrel by eliminating a series of gears. (Hanson-Van Winkle-Munning Co.)

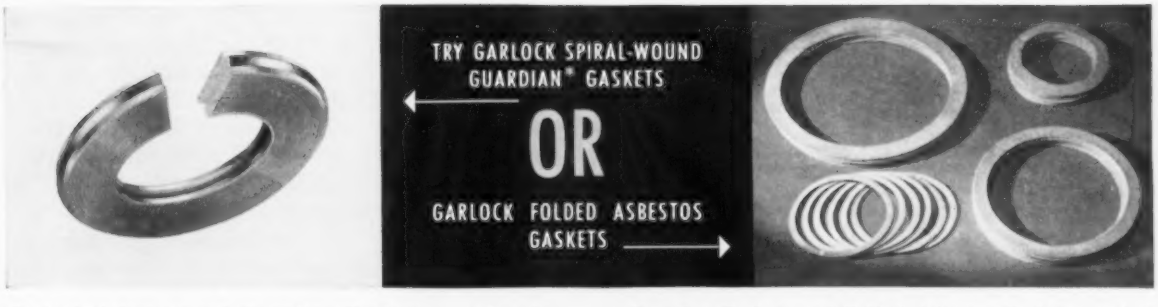
For free copy circle No. 40 on postcard

Wet Blast Cleaning

A 4-page folder describes a "wet" blast cleaning cabinet. With this unit, compressed air forces a slurry of water and fine abrasive against work to be finished. (Pangborn Corp.)

For free copy circle No. 41 on postcard

Sealing against high temperatures?



Garlock Spiral-wound Guardian Gaskets provide safe, positive sealing at temperatures to 1050° F. and pressures to 2500 psi. . . . and under lighter bolt loads, too! They are recommended for sealing against oils, steam, gases, liquids and most chemicals. In no other type gasket can you vary the compressibility to meet different requirements. They are constructed of spiral wound strips of V-shaped metal alternated with layers of asbestos paper or Teflon. Type metal and filler depend upon application. Ask for folder AD-104.

Garlock Folded Asbestos Gaskets are recommended for use against steam or gases to 600° F. where surfaces are irregular or pitted. They are most commonly used on boiler manholes and handholes, or on flanged joints of column stills or other equipment requiring a soft gasketing. Made of wire-inserted asbestos cloth, specially treated to withstand high temperatures, the gaskets are folded, formed and pressed to produce any desired shape.

Guardian Gaskets and Folded Asbestos Gaskets are just two more examples of the famous "Garlock 2,000" . . . two thousand styles of packings, gaskets, and seals for every need. The *only* complete line. You can ask your local Garlock representative for his unbiased recommendations. Or, write for Gasket Folder AD-162.

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Clear Coat Preserves Aluminum Surface

Unprotected aluminum exposed to weather gets dull, pitted, dirty; reflectivity decreases.

Many builders prefer aluminum's appearance, other features. One answer: a coating that protects while keeping natural color.

▪ Advantages of exterior aluminum awnings in reducing air conditioning costs for certain industrial and commercial buildings are a potent factor in the marketing of sun-control products for one major manufacturer.

The key to this company's approach depends upon the sustained protection of the aluminum surface from weathering and corrosion. Unprotected aluminum exposed to weather soon becomes dull and pitted. It accumulates dirt and grime. Moreover, its heat reflectivity decreases markedly with a considerable loss of effectiveness as a sun-control device.

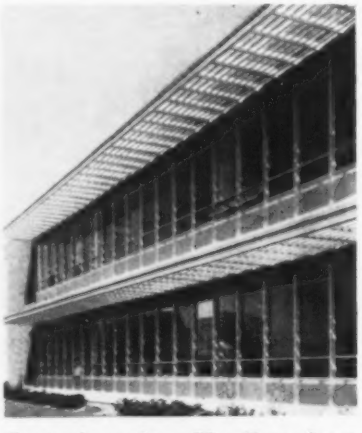
In order to preserve the surface of its products, O. O. McKinley Co., Inc., Indianapolis, applies a clear, protective lacquer based upon "half-second" butyrate. The butyrate lacquer is a non-yellowing coating specifically developed for aluminum. It not only preserves the metal surface from dulling and pitting but makes it simple to keep clean. Thus, the natural beauty and effectiveness of the original installation are maintained.

Heat Out; Air In — McKinley's awnings and cornices are engineered specifically to reflect the heat rays of the sun. Yet they permit light and air to enter. This is done by use of louvers constructed of clear-coated aluminum. These re-direct the rays of light through the window. At the same time they reject heat radiation.

Worker sprays clear lacquer on aluminum awning louvers.

Tests indicate that during summertime on unshaded east-west exposures, a solar heat load reduction of about 80 pct can be achieved with aluminum awnings. Similarly, on southern exposures at midsummer noon, the use of awnings gives a reduction of approximately 85 pct.

The firm formerly used clear enamels to coat their aluminum surfaces, later switching to a standard clear lacquer. It finally adopted a lacquer formulation developed by Egyptian Lacquer Mfg. Co., Newark, N. J., and Lafayette, Ind., based upon "half-second" butyrate supplied by Eastman Chemical Products, Inc., Kingsport, Tenn., a subsidiary of Eastman Kodak Co.



Coated awnings like these keep unwanted solar heat outside.

In production, the company cleans and etches the extruded aluminum in dip tanks. This gives the metal a satin finish designed to produce a soft, diffused light important in breaking up sunlight glare. Metal parts are then sprayed or dipped with the butyrate lacquer and assembled.

Builds Own Press

A mushrooming demand for larger powdered metal parts convinced executives at International Powder Metallurgy Co., Ridgway, Pa., that they needed some new

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equipment. But there were only three other machines in the country even similar to what they needed. So the company decided to build its own.

This month, the 400-ton hydraulic press went into operation. Resting on a 12 x 12 ft concrete block, the press now turns out 8-in. diam x 4-in. long parts. Most of these pieces are for use as transmission gears for appliances and automobiles, structural parts, and motor frames and stators.

Super Alloy Progress Ups Radiography Use

As more and more special alloys and super metals find use in nuclear applications, so will the need for radiographic inspection. That's the feeling of Wallingford Steel Co., Wallingford, Conn., which has just installed extensive radiographic examination facilities at its all-new metallurgical laboratory.

Part of the metallographic section, the radiography setup is expected to grow in importance along with a jump in production of special materials for atomic engineering work.

Complete Laboratory — A producer of strip, tubing and pipe, stainless, alloy and super metals, the firm uses the laboratory for quality control of its products. In addition to the radiography layout, the installation includes sections for studying the microstructure of metals, for analysis, special testing, etc.

Vacuum fusion gas analysis determines the concentration of oxygen, hydrogen and nitrogen in reactive and other metals in the analytical section. Orsat gas analysis of

Want More Data?

You may secure additional information on any item briefed in this section by using the reply card on page 111. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

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annealing atmospheres used throughout the mill, the analysis of chemical baths — pickling, rinse, soap, oil, etc.—and corrosion testing for

This vacuum fusion apparatus analyzes gases in metals.

both production orders and developmental purposes take place in this section.

Uses X-Ray Unit — X-ray diffractometer and fluorescent spectrographic equipment provide precision chemical analysis. These also aid investigation of the effect of processing on atomic arrangement.

Copper Plating Process Is Easy To Control

Using an entirely new combination of additives, a bright cyanide copper plating process is simple to control and it reduces costs. So states Metal & Thermit Corp., its developer. The process also promises fast plating speeds, improved brightness and other advantages on all common basis metals.

The solution can be made up with either sodium or potassium salts. Permissible cathode current densities range from 10 up to 60 ASF. A wide bright plate range at high cathode efficiency assures high rates of deposition without burning on edges or dullness in recessed areas. One shop reports that the bright cyanide copper enables them to meet thickness specifications with a uniformly bright deposit in half the time formerly required.

Uses New Additives—The performance of this new bright cyanide

Plated checks finish of copper-plated diecastings.

copper solution is partly due to a new bath additive, M&T Neochel. This improves anode corrosion and minimizes rough deposits, the firm says.

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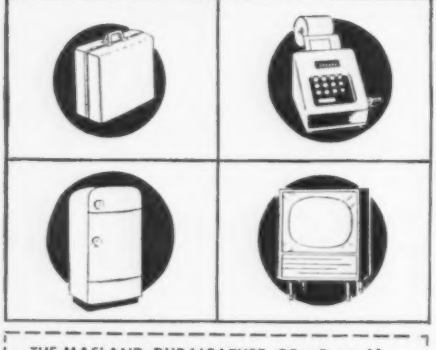
colorful, practical vinyl plastic for lamination to metal



- *Can be permanently laminated to metal . . . flat sheets or continuous coil.*
- *Can be crimped, shaped, bent or drilled without damage to textured finish.*
- *Won't chip, peel or fade.*
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USE FINKL DIE BLOCKS FOR QUALITY FORGINGS

...the automotive industry does!

An upstate New York forge shop specializes in the forging of crankshafts, knuckles, and other high production items used in automotive production. Because the volume of each particular forging is very high, it is possible to evaluate costs and study tooling very closely

In the illustration above, the manufacturer is using Durodi for both the blocking and finishing crankshaft impressions in this forging press operation.

Durodi, made by Finkl electric furnace quality steel practice is a high volume producer and a most practical hot work tool for close die forgings. It hardens deeply and uniformly, is resistant to abrasion and withstands both shock and impact loading at high hardness. Its Special Machining Quality also appreciably reduces sinking time. All of these advantages mean more production at less cost.

Finkl die blocks are available in several grades, all sizes and tempers to handle virtually any forging requirement. Call your local Finkl representative next time you are considering die blocks or forgings. He will be glad to help you and there is no obligation.

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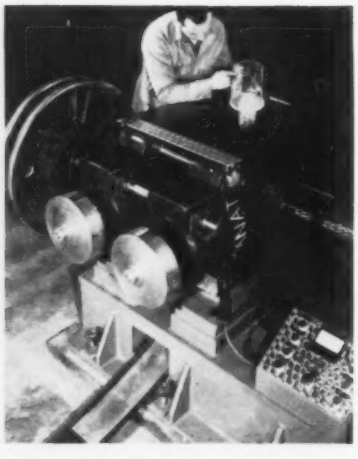
New Production Ideas

Equipment, Methods and Services



Rolling Mill Compacts Powder Into Sheet

Not only does this horizontal rolling mill compact metal powders directly into sheet and strip; it also converts into a vertical 2-high/4-high combination mill when needed. For metal powder rolling operations, it produces ferrous and nonferrous materials in widths to 7 in., thicknesses from 1/32 to ⅛ in. Thickness depends on material used. In tests, the machine compacted such diverse powers as aluminum, stainless steel, molybdenum, and tungsten. In addition it rolls materials for nuclear fuel elements and new alloys for rocket and missile uses. The unit can make use of both wider and larger diameter rolls. For example, 10-in. diam, 12-in. face-width rolls can be used instead of the 8 x 8-in. rolls with which the mill has initially been equipped. Capacities can thus be increased to make 11-in. wide sheets, over ⅛-in. thick. (Stanat Mfg. Co., Inc.)

For more data circle No. 42 on postcard, p. 111

Tool Countersinks Smoothly, Without Chatter

Heat-treated for uniform hardness, this single-lip countersink is designed for smooth, chatterless operation even in tough alloy steels. It comes in seven body diameters, in increments of ⅛ in. from ¼ to 1 in. Each size offers standard angulations of 60, 78, 82, 90, 100, 110 or 120°. The cutting edge and rigid radial relief control assure fast, clean cutting, its maker says. Working comparison tests, the firm points out, indicate that this tool is highly efficient for either countersinking or external deburring applications. The single-lip countersinking tool is produced of specially selected high speed steel, which is heat treated in the manufacturer's own plant. (Schrillo Aero Tool Engineering Co.)

For more data circle No. 43 on postcard, p. 111

Changes Miller Arbors Quickly, Easily

Setup time involved in changing arbors and cutters sometimes exceeds actual cutting time on some milling machine jobs. Not so with machines having a new type spindle nose. Incorporated in 28 sizes, types and styles of one maker's knee-and-column milling machines, this new spindle nose design provides a quick, easy method of changing arbors. Dimension and basic design of the manufacturer's standard spindle nose are retained. The nose accommodates the company's new line of No. 50 standard flanged arbors and adaptors. These new arbors can also be used on older units without the arbor locking feature. Special purpose quick-change accessories are not required. The arbor locking unit can be dismantled within a minute's time to mount face milling cutters on the spindle nose. The conventional draw-in bolt is also supplied for tooling setups which require it. (Cincinnati Milling Machine Co.)

For more data circle No. 44 on postcard, p. 111

Resistance Welding Tank Cooling Fins

SCIAKY

HELPS PUT PROFIT INTO MANUFACTURING

Sciaky Techniques Permit Adaptation of Standard Equipment to Automated Production

Automated seam welding is another Sciaky Resistance Welding Technique that can improve profit potential. And, the adaptation of *standard* equipment means that now profits increase faster because no huge expenditures are required for constructing "special" welders.

For example, the largest independent manufacturer of transformers in the world, Moloney Electric Co., St. Louis, Mo., automated the seam welding operations for their distribution transformer tanks by merely adding an automatic positioning fixture to a *standard* Sciaky Patented Three-Phase Resistance Welder.

Welding cooling fins to the tanks was originally a slow, costly arc welding job, and only one "L" shaped fin could be fastened at a time. Production requirements increased and fusion welding costs became prohibitive. As a result two standard Sciaky Longitudinal Seam Welders were installed to weld fins in "U" shaped pairs. Thus, Sciaky Resistance Welding Techniques increased production, and also improved tank design. Manual positioning of tanks and fins was adequate to meet production requirements at that time.

FIG. 2 After first weld cycle begins, electrode wheels progress down first fin as tank automatically indexes into throat of the welder. The tank then indexes radially for insertion of second fin, which is welded in position on return stroke of the tank back out of throat of the welder.

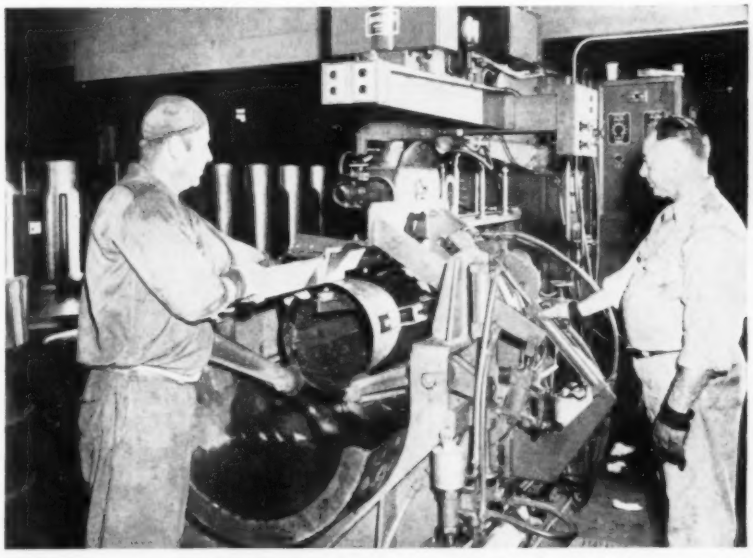


FIG. 1 After tank is loaded in automatic fixture, operator inserts first pair of "U" shaped fins in welding position. (Two brackets mounted on side of tank were joined in previous projection welding operations.)

Then, because of constantly rising materials and labor costs, Moloney faced the same "sliding profits" problem that confronts every manufacturer today. A research program was initiated to determine how to cut costs and improve manufacturing methods. This led them to study simple *automation* of the cooling fin and tank assembly operations.

Automatic Positioning Fixture

Sciaky engineers helped solve the problem with the new Sciaky Longitudinal Seam Welder equipped with special automatic fixturing. This automatic positioning fixture provides continuous, fool-proof seam welding of the cooling fins. A simple adjustment permits immediate change-over for various tank sizes, as well as radial spacing of fins.

This is how the *standard* Sciaky welder with automatic positioning fixture cuts manufacturing costs and increases production—all three operations are performed in one cycle . . .

(1) The machine welds one pair of cooling fins to the tank as it indexes into throat of welder.
(2) Positioner then indexes tank radially for the next seam welding operation.
(3) On return stroke, the machine seam welds the second fin.

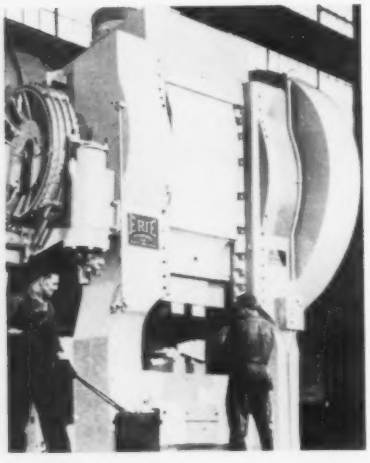
Results

The Sciaky Patented Three-Phase Resistance Welder with automatic positioning fixture and two operators DOUBLED production over the previous method when two welders and four operators were required. The two previous machines and the extra two men were absorbed into other resistance welding operations.

Information Available

Case histories outlining the successful use of Sciaky Resistance Welding Techniques are available on request. Specific recommendations will be furnished on receipt of an outline of your requirements.

Write today, mentioning the information you would like to receive. No obligation. Sciaky Bros., Inc., 4923 W. 67th St., Chicago 38, Illinois. POrtsmouth 7-5600. 63D



Forging Press Offers Workers More Room

Ease of operation and maintenance are key features of this mechanical forging press. Complementing these advantages is a press setup that gives operators more working room. Improving on an earlier design, company engineers spread the front columns and moved the working area forward to give operators 8 in. more clearance for manipulating work in and out of the die. Thus, the operator can move closer to the die, use shorter tongs, and have greater visibility than with previous models. Over-all press height is 11 ft 3 in., a 3-ft reduction over other machines. Allowing this is a Scotch Yoke (sliding block) which transmits pressure from the eccentric shaft to the ram. This Scotch Yoke also provides a large bearing area, increases press rigidity, and eliminates the pitman and ram pin. A circulating flood system lubricates the main bearings. (Erie Foundry Co.)

For more data circle No. 45 on postcard, p. 111

Micrometer Is Strong, Rigid, Lightweight

High strength, rigidity and light weight are assets of this 1-in. micrometer caliper. Specially forged and ribbed for extra strength, this tool's frame tapers to the anvil which permits use in narrow slots and tight places. Finish on the frame is smooth black enamel for easy clean-up; the thimble and sleeve have a hard, long-wearing satin chrome finish which eliminates glare, rust, stains. (L. S. Starrett Co.)

For more data circle No. 46 on postcard, p. 111

Vacuum Sinter Furnaces Operate at High Heats

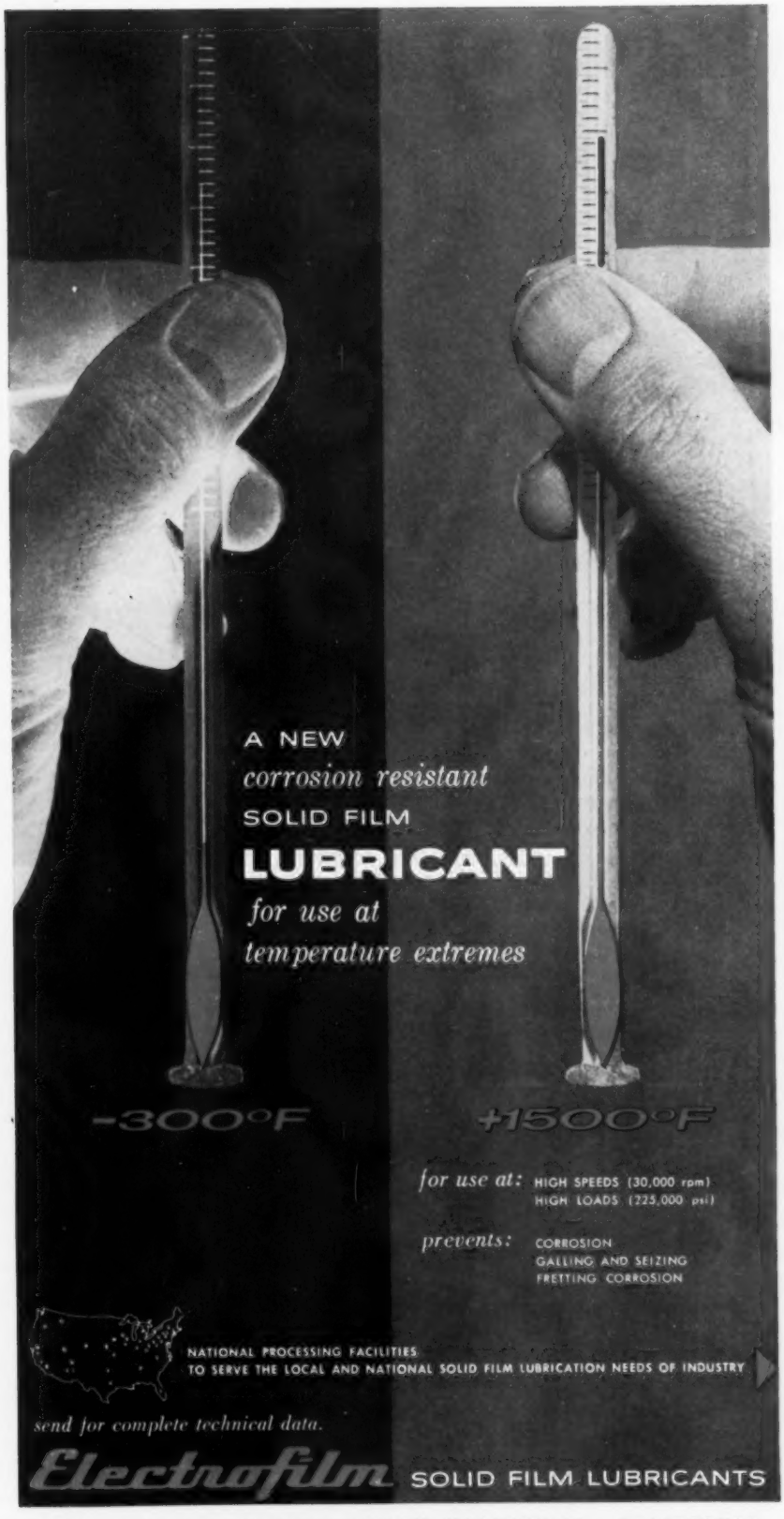
With temperature capabilities in the 200° to 2600°C range, this high vacuum furnace is induction heated. Its upper temperature limit makes the unit especially suitable for vacuum sintering of materials such as tantalum electrical capacitor compacts or special high purity carbides. It uses a graphite, molybdenum or tantalum susceptor to create high temperatures around the material being sintered. A conventional induction power supply heats the susceptor. Complete instrumentation for temperature control and recording comes as a part of the systems. The furnace uses combination pumping system of both mechanical and oil-vapor diffusion and booster pumps. These help develop and maintain high vacuum operating conditions in the order of 0.1 micron and less. Units are presently available with uniform temperature work zones ranging from 3-in. diam x 6-in. high to 8-in. diam x 12-in. high. (F. J. Stokes Corp.)

For more data circle No. 47 on postcard, p. 111

Finishing and Roughing Bars Cut Setup Time

Finishing and roughing bars now available aim to reduce setup time and speed adjustment and blade changes without removal from the machine. A floating mount permits chip load to balance between the two cutting edges, producing a smooth surface. Adjustable blades come in a wide range of bore sizes. Inside faces of blades are serrated. (Robert H. Clark Co.)

For more data circle No. 48 on postcard, p. 111



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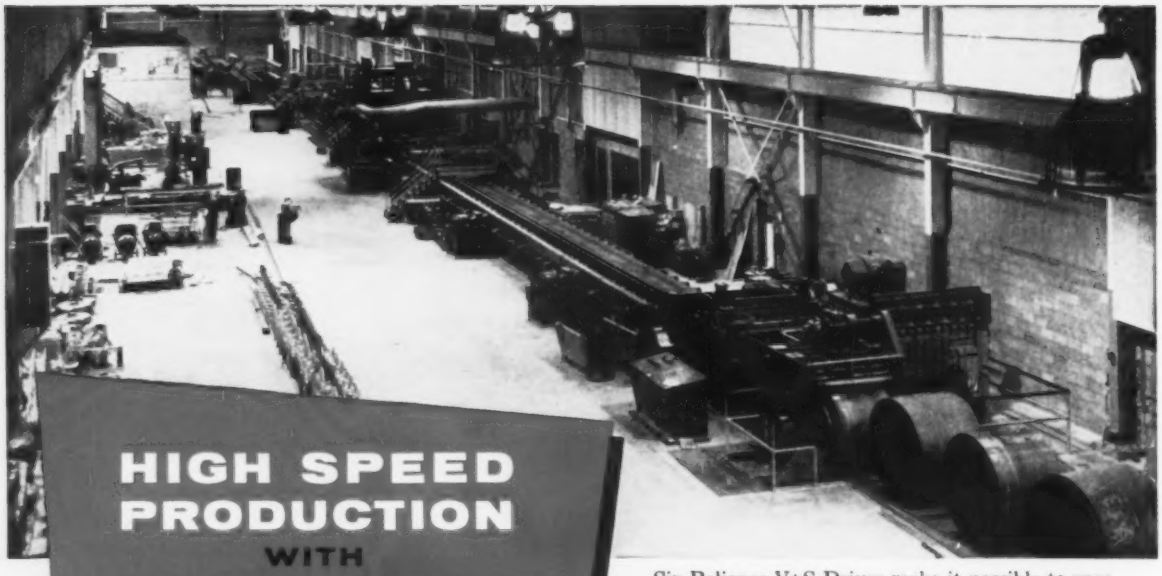


HIGH SPEED PRODUCTION WITH RELIANCE V★S DRIVES

Six Reliance V★S Drives make it possible to operate this complete line as if it were a single machine.

Carloads of pipe are pouring out of the new Edmonton, Alberta plant of Alberta Phoenix Tube & Pipe, Ltd. This $6.5 million installation is producing pipe at unprecedented rates.

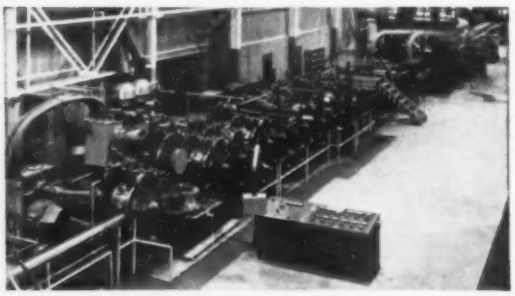
Volume pipe production requires something special in a drive system—one that furnishes precise speed control and instantaneous motor response. A wide stepless range of speeds is provided to handle various pipe diameters and lengths, and all sections of the line operate at the same relative speed.

A team of Reliance Application Engineers, working with the machinery builder, built this specialized drive. This team knows the processes of the steel industry and how to handle the problems involved. Engineering knowledge, backed by the quality of Reliance products, supplied this accurate, simple-to-operate, economical drive.

The Reliance Application Engineering Department builds drives for every industry. A team of engineers who are experts on your industry's operation, stand ready to engineer and build the drive for your particular needs.

If you would like more information on this installation, write for Bulletin L-2505.

L-1541



The welding section operator controls the speed of the entire line from this Reliance Pendent Station.

The Reliance V★S Drive on this flying cutoff automatically measures the pipe and controls the movement and speed of the carriage.

RELIANCE ELECTRIC AND ENGINEERING CO.

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High Pressure Valves

High pressure valves with explosion-proof solenoids are designed for use in hazardous locations. Valves rate for oil and water pressures from 0 to 250, 0 to 1500, 0 to 3000 psi. They rate for air pressures 0 to 250, 0 to 1000, 0 to 1500 psi. Valves come in 4-way, 3-way, shutoff and diverter flow patterns. (Barksdale Valves).

For more data circle No. 49 on postcard, p. 111

Disposable Pen

Made of polyethylene, a new "pen" writes on practically any metal or other materials. And you can throw it way after it runs out of marking ink. The pen consists of a plastic tube and a felt writing point. It marks porous and nonporous surfaces, comes in many colors. (Organic Products Co.)

For more data circle No. 50 on postcard, p. 111

Socket Screws

Self-locking socket head cap screws just introduced are available from stock in all diameters from microsize No. 0 to 1½-in. dia. The socket screws are made self-locking by a nylon pellet inserted in threaded section of the screws. They can be used again and again without loss of holding power. The screws will not work loose under severe vibrations; yet, they can be removed as easily as a conventional screw. Self-locking screws of this type generally retain their locking action at temperatures from —70° to 250°F through repeated heating and cooling cycles. (The Cleveland Cap Screw Co.)

For more data circle No. 51 on postcard, p. 111

Two-chamber Oven

A new oven is used for relief of hydrogen embrittlement on plated parts and stress relieving and normalizing of tools, springs, etc. The principal feature of this oven is its two chambers. Each operates independently. They have individual maximum operating temperatures. Electric heating is employed. It can be had with either electric or gas heating equipment. The upper chamber has a 15-kw heat input capacity, with a maximum operating temperature of 1000°F. It also has a 720 cfm stainless steel interior and recirculating blower. Bottom of work space is 50 in. from the floor. The lower chamber has a 6-kw heat

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input capacity with a maximum operating temperature of 650°F. This chamber has a 400 cfm recirculating blower. Bottom work space is 25 in. from floor. Common to both chambers is a work space 24 x 24 x 18 in. high, single doors, one control panel, individual indicating and excess temperature controls. (Grieve-Hendry Co., Inc.)

For more data circle No. 52 on postcard, p. 111

Motor Brake

This brake is for use with fractional hp electric motors in frames 56-C and 66-C, also integral motor frames 182 and 184. The most recent addition to its maker's line of brakes designed for use on stub, extended, or thru shaft applications, this new model retains the basic single solenoid, lever action and "unitized" construction of previous units. Furnished as standard are: cast iron housing and endplate, visual wear indication, and automatic manual release and reset. This brake

is available for operation on all standard alternating current voltages. (Stearns Electric Corp.)

For more data circle No. 53 on postcard, p. 111

Acetylene Generator

Boasting a 500-lb carbide capacity, a new acetylene generator employs a recently developed automatic signal system. The generator produces 1000 cu ft of medium-pressure acetylene per hour. Delivery rates up to 2000 cu ft of acetylene per hour are obtainable over shorter intermittent operating periods. The automatic signal setup consists of a howler and indicator lights; these give both audible and visual warning if mininum carbide supply, water level, or water temperature should deviate from normal. (Linde Co.)

For more data circle No. 54 on postcard, p. 111

Setup Production Tests

For production-rate testing, a new automatic go-no go Brinell hardness tester checks odd-shaped pieces weighing 10 lb each. This tester correctly accepts or rejects parts at rates up to 1000 parts per hour. Constructed as a revolving "three station" unit, it automatically grinds a smooth test surface, applies load (3000 kg), measures depth of impression, and accepts or rejects

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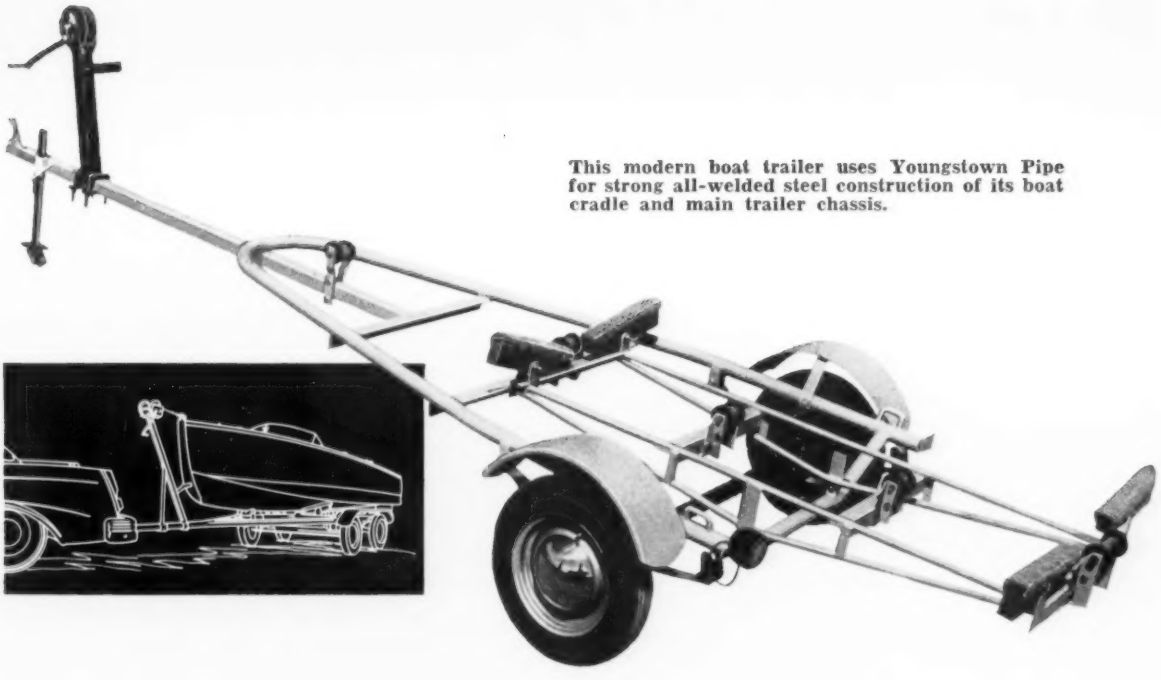
Write for Catalog showing complete System of Armstrong Set-Up and Hold-Down Tools.



This modern boat trailer uses Youngstown Pipe for strong all-welded steel construction of its boat cradle and main trailer chassis.

YOUNGSTOWN CONTINUOUS WELD PIPE

. . . provides extra-strength chassis for "Texan" boat trailers

Here's an unusual application for steel pipe. "Texan" Boat Trailers, produced by the Cunningham Trailer Works of Lubbock, Texas, are fabricated from Youngstown Pipe to provide users maximum cargo protection as well as greatest ease during loading, unloading and while making the haul.

In line with Cunningham's policy of using only the highest quality raw materials, they wisely specify Youngstown Continuous Weld Pipe for fabrication of both the boat cradle and main trailer chassis. This gives Texan boat trailers a sturdy welded steel construction able to withstand the most rugged use—on or off the highway. Why not use Youngstown Pipe structurally to build strength and quality into your products?

Your local Youngstown Distributor is the man to call when you want quality pipe—day or night. He has a complete stock and his on-the-spot fast delivery will help keep your operations humming along at top speed. Why not call him today?

Next time you need pipe—for any purpose — specify Youngstown and secure these 7 Points of uniform goodness

uniform ductility
uniform lengths
uniform threading
uniform weldability
uniform wall thickness and size
uniform strength and toughness
uniform roundness and straightness

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
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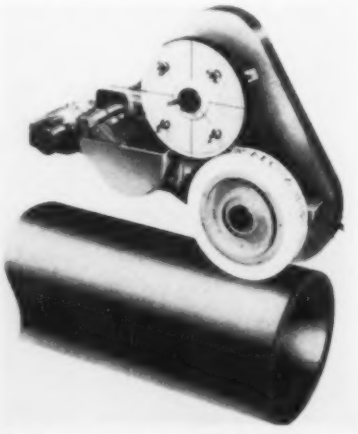
Brinelled parts without manipulation or judgment by the operator. He merely places the parts in the holders before they are rotated to the first station. In using this new automatic hardness tester, the operator places two parts at a time in the holders on the periphery of the large circular worktable, movement of which is controlled by a pre-set timer. The table automatically rotates a quarter turn to the first or grinding station, where a small, smooth area is ground by twin grinding wheels. (Tinius Olsen Testing Machine Co.)

For more data circle No. 55 on postcard, p. 111

Offset Printer

An industrial offset printer continuously prints on steel, aluminum or plastic pipe, bars, tubing or like products. Mounted directly over a moving production line, this unit prints on an unlimited range of product sizes from ½-in. O.D. Utilizing the offset principle of printing



transfer, the setup is capable of continuous printing speeds as high as 1000 fpm. This means that in one 8-hour shift as much as 50,000 ft of material can be printed with pertinent data such as trademark, date, coil number, size, gage and weight per foot. (Jas. H. Matthews & Co.)

For more data circle No. 56 on postcard, p. 111

Lathe Center

Precision-built live centers just announced feature a simple six-part design. The one-piece main body, serving as a cup for the roller bearing on which the spindle turns, permits use of a greater than normal capacity bearing in a standard size body. It automatically adjusts for wear. (J. & S. Tool Co.)

For more data circle No. 57 on postcard, p. 111

Soldering Tips

Multi-coating of soldering tips via a new process makes the shank of the tip immune from solder. This prevents creeping and adhering of solder except on the working surface at the end of the tip, says its maker. It also prevents creeping of solder into the tip hole and the dropping of solder on components. Longer tip life is said to result, as is reduced maintenance since tips need no filing or dressing. Many shapes and sizes are available. (Hexacon Electric Co.)

For more data circle No. 58 on postcard, p. 111

SRH
NEW STAR in the MILLER
GOLD STAR LINE
The revolutionary dc welding performance achieved by the new Miller Gold Star transformer, completely sealed, semimetallic rectifier and weld stabilized circuit is now available in the SRH models. Developed specifically to save room, the SRH is only 30¼" high, offers 200, 300 and 400 ampere machines ideally designed for stacking or paralleling in minimum space.
Complete particulars on the new Miller GOLD STAR SRH will be sent promptly on request.
miller ELECTRIC MANUFACTURING COMPANY, INC.
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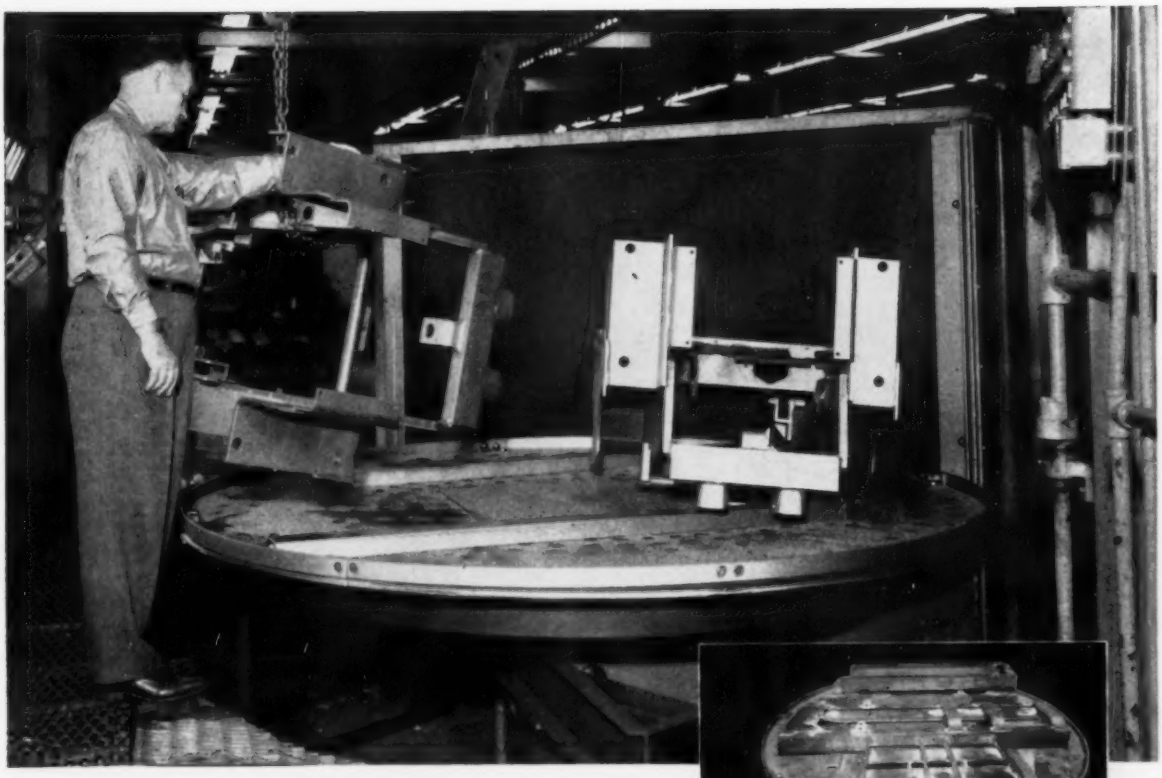
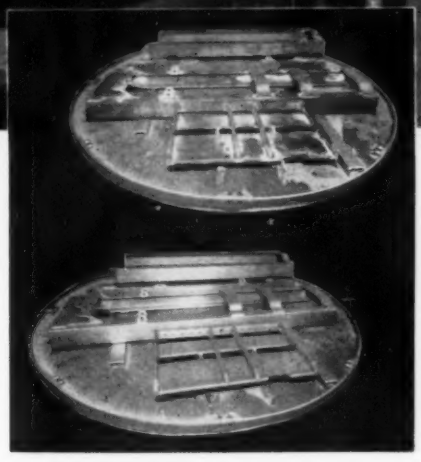




WHEELABRATOR® opens the door to $40,000 annual savings

Slashes weldment cleaning time ½ to ⅔ for Towmotor

Wheelabrator airless abrasive blast cleaning of lift truck weldments paid for itself in less than a year at Towmotor Corp., Cleveland, by replacing manual wire brushing and sanding. Annual savings were more than $40,000.

According to the Towmotor standards departments, saving like these have been reported: Pieces that required 37 minutes for cleaning and chipping are now Wheelabrator cleaned in an average time of 12 minutes, bringing savings of $2.43 per piece. Lift truck frames formerly requiring an average of 1¼ hours for grinding, sizing and cleaning now require only 35½ minutes, bringing $3.88 savings apiece.

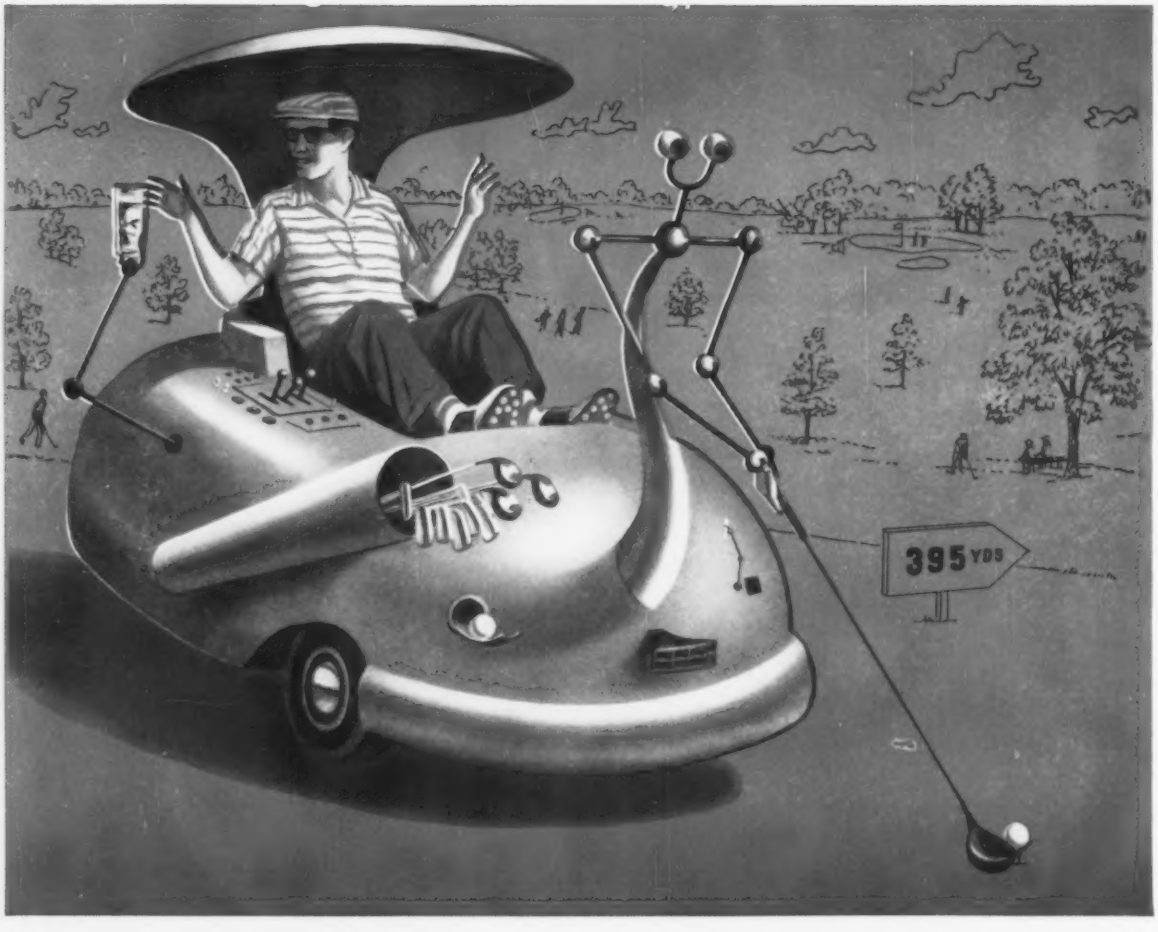
Besides saving time and money, Towmotor reports the Wheelabrated surface provides a superior bond for painting and adds that quality is improved because substandard welds are exposed prior to painting.

Wheelabrator airless blast cleaning is the fastest method of metal cleaning known. There is a machine available for handling all types, sizes and shapes of work. Investigate the savings you can make with the Wheelabrator.

Write today for full details on Wheelabrator airless blast cleaning. Ask for Bulletin 74C

WHEELABRATOR
CORPORATION
510 South Byrkit Street, Mishawaka, Indiana

WORLD'S LARGEST MANUFACTURER OF AIRLESS BLAST CLEANING EQUIPMENT



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Designed for the golfer who likes to goof . . . off. But before you produce the "Golf-Master", you had better find out about cold rolled steel from your A.W. Representative. He is the man to see in every case! Your A.W. Representative may order a metallurgical study of your problems and bring about savings that build new profits and greater potential. He can provide you with the latest information on cold rolled steel and its application, plus experienced advice on the gauge, size and type to order. Call him today. Your A.W. Representative is always available . . . never out of touch with your location.

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The Iron Age Summary

Inventory Cuts May Be Leveling

Steel stocks of many metalworking firms have dipped to dangerous lows.

Survey shows growing minority expects to buy more in second quarter.

▪ Steel inventory cutbacks by metalworking companies may be leveling off.

An IRON AGE survey indicates that (1) steel stocks of many firms have dipped to dangerously low levels, and (2) some steel users are trying to hold inventories on an even keel during the first quarter. A growing minority of companies plan to buy more steel in the second quarter than in the current three-month period.

A Ray of Hope—But important companies in the automotive, steel warehouse, farm equipment, construction equipment, materials handling, and transport equipment industries still plan to whittle down their in-plant steel stocks through first quarter.

Steel buyers are cautious about second quarter commitments. But there are rays of hope. About 54 pct of a random sample of U. S. industry expect to order as much steel from mill and warehouse in second quarter as they will in first. Another 36 pct will boost their buying. Less than 10 pct say they will continue their inventory cuts during second quarter.

Some Bright Spots—Some second quarter buying forecasts are surprisingly good. A manufacturer of heavy equipment will double his first quarter steel intake. Another major producer of heavy machinery will boost his steel buying by 10 pct in second quarter. A stainless steel fabricator will double his second quarter intake over first quarter.

Steel buyers are making no bones about their low inventory position. They lean heavily on fast mill delivery and frequent trips to warehouses to keep from running short. They're gambling on a slow, steady pickup in the economy rather than an overnight reversal.

No Price Hedging—Steel users indicate they do not plan to stock up on inventory as a hedge against a price boost in steel.

Here's how some companies view the current steel picture:

A fabricator of stainless and carbon steels: "This is the lightest first quarter buying I can remember for our plant. We're coming up in second quarter, but we'll still be 40 pct below what we did in second quarter last year."

A construction equipment producer: "We'll wind up our inventory reduction in March, but we really got most of it out of the way in November and December. Of course we'll be off from a year ago."

A steel warehouseman: "Our company is pretty well leveled on inventory. We're reducing, but mainly in plate."

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,479	1,496	1,498	2,496
Ingot Index				
(1947-1949=100)	92.1	93.1	93.2	155.4
Operating Rates				
Chicago	58.0	57.0*	65.0	94.0
Pittsburgh	59.5	57.5*	49.5	100.0
Philadelphia	63.0	63.0*	60.0	104.5
Valley	46.0	45.5	35.5	97.0
West	63.5	62.0*	70.0	102.5
Buffalo	54.0	54.0	56.0	105.0
Cleveland	39.0	45.0*	57.0	95.0
Detroit	52.0	51.0	73.0	102.0
S. Ohio River	58.0	58.0*	68.0	87.0
South	52.0	56.0	71.0	96.5
Upper Ohio R.	57.0	60.0*	57.0	108.0
St. Louis	74.0	66.0*	76.0	100.0
Northeast	31.0	31.0	31.0	31.0
Aggregate	....	55.4	58.5	97.5

*Revised

Prices At a Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.967	5.967	5.967	5.622
Pig Iron (Gross ton)	$66.42	$66.42	$66.42	$62.90
Scrap, No. 1 hvy (Gross ton)	$35.00	$34.33	$32.83	$55.50
No. 2 bundles	$27.17	$26.17	$24.50	$44.83
Nonferrous				
Aluminum ingot	28.10	28.10	28.10	27.10
Copper, electrolytic	27.00	27.00	27.00	36.00
Lead, St. Louis	12.80	12.80	12.80	15.80
Magnesium ingot	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin Straits, N. Y.	94.00	92.25*	92.75	102.50
Zinc, E. St. Louis	10.00	10.00	10.00	13.50

Truck Dealers Eager for Sales

Customers are getting plenty of attention from industrial truck distributors and manufacturers.

Sales of special or modified units are off. Buyers are concentrating more on the standard models.

▪ Telephone your industrial truck dealer and chances are he will be knocking on your door almost before you hang up the receiver. He has both the time and the inclination to give personal attention. The average lift truck dealer is caught in a double squeeze.

Overall, lift truck buying is down about 18 pct from early 1957 levels. Also, dealers report more customers are seeking a better price by going directly to the maker.

Backlogs Thinned — Customers who do negotiate with an independent agency usually want a large markdown. Many dealers are being hit pretty hard. Their answer has been to stress their function in keeping the equipment operating with prompt service and delivery of parts.

Manufacturers report orders are definitely off, shipments are down, and once healthy backlogs have been "thinned out drastically." One large maker of an extensive line says his backlog is down about 15 pct. Most of the companies have had to pull in their belts. The first things to go were capital expansion projects.

Buy Right Off Floor — Newer model trucks are smaller but more powerful, have smaller turning radii, are much narrower, and there are more sidelift units around.

In some cases smaller standard industrial trucks can be bought right off the floor. In any case you probably won't have to wait more than 30 days for any standard model of less than 20,000-lb capacity. Heavier standard units won't take much more than 60 days.

Manufacturers report there are fewer inquiries for special or modified units these days. This, they say, is normal. When business is off, customers want fast delivery of the least expensive basic model. They expect the specialized market to recover to its normal 50 pct when overall business gets better.

Those interested in special trucks will find almost the same engineering facilities as in 1957. One major maker, which cutback elsewhere, still has a staff of 30 engineers to work with customers. Fewer subassemblies are let to subcontractors. This manufacturer says he can deliver the average modification in from 60 to 90 days.

Prices Could Rise—Another sign of the times is the slight shift in favor of gas powered units. These are cheaper than electric initially, but cost more to operate.

Despite current discounting, many industrial truck manufacturers are contemplating price hikes in the 2nd or 3rd quarter. They say costs are rising, and this will eventually solve the problem of discounting.

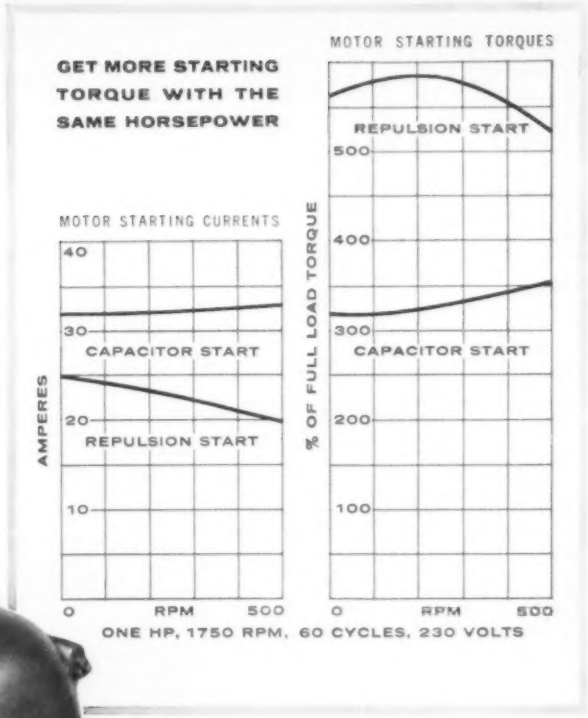
Although they won't say so, price hikes probably depend on business conditions. The industrial truck market is still keenly competitive. In a squeeze most makers would probably prefer to make enough to just about cover overhead, rather than price themselves right out of the market.

SIDE ARMS: The Traveloader, with forks on its side rather than in front, was designed by Baker Industrial Truck Div., Otis Elevator Co. It is one of many approaches to the problem of narrow warehouse aisles.

WAGNER SINGLEPHASE MOTORS

This two-in-one motor is your best choice

FOR HARD-TO-START LOADS



H. P.	OLD FRAME SIZE	PRESENT FRAME SIZE
1	203	182
1½	204	184
2	224	213
3	225	215
5	254	254U

Integral ratings, 1-5 hp are available in the latest NEMA Frame Sizes

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Deliveries Shorten For Heavy Steel

Less demand from fabricators for plate and structurals eases market.

U. S. Steel Export cuts prices on standard rails, joint bars and tie plates.

■ The inventory jitters have caught up with the heavy steel market.

As a result, delivery promises from the mills on heavy and light plate, structurals, and linepipe are shortening. A decline in demand for fabricated steel is hurting plate and structurals. Fabricators are cutting inventories as their backlogs dip. In about a year one large fabricator's backlog has dropped from 24 to 6 months.

In Late, Out Early — Easing in the linepipe market reflects the wave of tonnage cancellations from transmission line builders. Currently linepipe producers are supplying customers out of stock in many cases—and urging them to place orders.

"Rush-rush" ordering of sheet, strip, bar, and other products continues, usually involving small tonnages. Buyers are requesting cold-rolled sheet at the beginning of a month for delivery at the end. Hot-rolled orders, also for shipment at month's end, are coming in around the middle of the month. Bar mills are struggling to fit orders into truncated rolling schedules.

Drop in Export Rail Price — United States Steel Export Co., effective January 25, reduced its base prices for standard rails, joint bars, and tie plates. Standard rails are $113.62 a net ton, a reduction of $4.98 a ton. Joint bars are 7.155 cents per lb, down $13.70 a ton, and tie plates are 6.78 cents per lb, a decline of $17.60 per ton.

Prime reason for the adjustment, according to a U. S. Steel Export Co. spokesman, is the need to meet competition from foreign steel producers. Other U. S. exporters indicate they will make similar price revisions.

Sheet and Strip—February shipments of hot- and cold-rolled sheet will be below those of January at many mills. Producers hope this will be the low point with improvement or stabilization in March. But they admit there's not much basis for optimism.

Plate — Users are getting more insistent on fast delivery in the heavy plate market. One **Eastern** mill reports losing an order when they offered two week delivery. A competitor came up with a shipment promise of 5 days. Bookings are slow, with buyers seeing no need to get orders in early.

Bars—Unless mills can guarantee delivery in 2 weeks customers go elsewhere with their orders. Producers are now coding rush orders in some areas to speed them through the mills. Cold finishers still get rush orders for out-of-the-way shapes in small quantities. Hot rolled bar producers have compressed rolling schedules to get product out. They do not have the volume to keep mills working steadily.

Stainless—Producers are hoping for a pickup but so far there's virtually no evidence to announce its coming. A **Pittsburgh** producer does report January orders and shipments are running ahead of December's. Automotive orders for cold rolled strip are down.

Pipe and Tubing — Some slight improvement in standard pipe has not been enough to raise mill operations above 4 days a week in the **Pittsburgh** area. Oil country seamless is poor with producers filling orders right out of stock. Mills are asking oil producers to advance their order for linepipe.

Delivery Promises at a Glance

	Pittsburgh	Chicago	Cleveland	Detroit	East	West Coast
CR Carbon Sheet	2-4 wks	1-4 wks	3-4 wks	3-5 wks	3-6 wks	4-6 wks
HR Carbon Sheet	1-2 wks	1-2 wks	2-3 wks	2-4 wks	2-4 wks	4-6 wks
CR Carbon Strip	2-4 wks	1-4 wks	3-4 wks	3-5 wks	3-6 wks	4-6 wks
HR Carbon Strip	1-2 wks	1-2 wks	2-3 wks	2-4 wks	2-4 wks	4-6 wks
HR Carbon Bars	1-2 wks	1-2 wks	2 wks	2-4 wks	2-4 wks	2-4 wks
CF Carbon Bars	1-4 wks	1-3 wks	1-3 wks	1-2 wks	1-3 wks	1-2 wks
Heavy Plate	1-8 wks	3-4 wks			4-8 wks	6-8 wks
Light Plate	1-3 wks	1-2 wks	2-3 wks		2-4 wks	4-6 wks
Merchant Wire	1 wk	1 wk	1 wk		Stock	3-4 wks
Oil Country Goods	1-6 wks	1-3 wks	2-3 wks		4-6 wks	
Linepipe	1-8 wks	6-10 wks	3-6 wks		1-6 mos	5-6 wks
Buttweld Pipe	1 wk	1 wk	1 wk	2-3 wks	Stock	3-4 wks
Std. Structurals	1-8 wks	2-3 wks		4-8 wks	4-6 wks	4-6 wks
CR Stainless Sheet	2-4 wks		1-2 wks	1-2 wks	2-4 wks	
CR Stainless Strip	2-3 wks		1-2 wks	1-2 wks	2-4 wks	

COMPARISON OF PRICES

(Effective Jan. 28, 1958)

Steel prices on this page are the **average** of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in **Heavy Type**: declines appear in *Italics*.

	Jan. 28 1958	Jan. 21 1958	Dec. 27 1957	Jan. 29 1957
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.925¢	4.925¢	4.925¢	4.675¢
Cold-rolled sheets	6.05	6.05	6.05	5.75
Galvanized sheets (10 ga.)	6.60	6.60	6.60	6.30
Hot-rolled strip	4.925	4.925	4.925	4.675
Cold-rolled strip	7.17	7.17	7.17	6.870
Plate	5.12	5.12	5.12	4.87
Plates, wrought iron	13.15	13.15	13.15	10.40
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	50.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.30	$10.30	$10.30	$9.95
Tin plates, electro (0.50 lb.)	9.00	9.00	9.00	8.65
Special coated mfg. ternes	9.55	9.55	9.55	9.20
Bars and Shapes: (per pound)				
Merchant bar	5.425¢	5.425¢	5.425¢	5.075¢
Cold finished bars	7.30	7.30	7.30	6.85
Alloy bars	6.475	6.475	6.475	6.125
Structural shapes	5.275	5.275	5.275	5.00
Stainless bars (No. 302)	45.00	45.00	45.00	43.25
Wrought iron bars	14.45	14.45	14.45	11.50
Wire: (per pound)				
Bright wire	7.65¢	7.65¢	7.65¢	7.20¢
Rails: (per 100 lb.)				
Heavy rails	$5.525	$5.525	$5.525	$5.075
Light rails	6.50	6.50	6.50	6.00
Semifinished Steel: (per net ton)				
Rerolling billets	$77.50	$77.50	$77.50	$74.00
Slabs, rerolling	77.50	77.50	77.50	74.00
Forging billets	96.00	96.00	96.00	91.50
Alloy blooms, billets, slabs	114.00	114.00	114.00	107.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.15¢	6.15¢	6.15¢	5.80¢
Skelp	4.875	4.875	4.875	4.225
Finished Steel Composite: (per pound)				
Base price	5.967¢	5.967¢	5.967¢	5.622¢

	Jan 28 1958	Jan. 21 1958	Dec. 27 1957	Jan. 29 1957
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.51	$70.51	$70.51	$66.88
Foundry, Valley	66.50	66.50	66.50	63.00
Foundry, Southern Cin'ti	71.65	71.65	71.65	67.17
Foundry, Birmingham	62.50	62.50	62.50	59.00
Foundry, Chicago	66.50	66.50	66.50	63.00
Basic, del'd Philadelphia	70.01	70.01	70.01	66.38
Basic, Valley furnace	66.00	66.00	66.00	62.50
Malleable, Chicago	66.50	66.50	66.50	63.00
Malleable, Valley	66.50	66.50	66.50	63.00
Ferromanganese, 74-76 pct Mn, cents per lb‡	12.25	12.25	12.25	12.75
Pig Iron Composite: (per gross ton)				
Pig iron	$66.42	$66.42	$66.42	$62.90
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	**$33.50**	$32.50	$32.50	$54.50
No. 1 steel, Phila. area	38.00	38.00	35.50	59.50
No. 1 steel, Chicago	**33.50**	32.50	30.50	54.50
No. 1 bundles, Detroit	**23.50**	22.50	19.50	**45.50**
Low phos., Youngstown	35.50	35.50	33.50	57.50
No. 1 mach'y cast, Pittsburgh	49.50	49.50	50.50	59.50
No. 1 mach'y cast, Philadel'a	47.50	47.50	50.50	60.50
No. 1 mach'y cast, Chicago	47.50	47.50	43.50	53.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	**$35.00**	$34.33	$32.83	$55.50
No. 2 bundles	**27.17**	26.17	24.50	44.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$15.38	$15.38	$15.38	$15.50
Foundry coke, prompt	$17.50-$19	$17.50-$19	$17.50-$19	$18-19
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	25.00	25.00	27.00	36.00
Copper, Lake, Conn.	25.00	25.00	27.00	36.00
Tin, Straits, N. Y.	**94.00†**	92.25*	92.75	102.50
Zinc, East St. Louis	10.00	10.00	10.00	13.50
Lead, St. Louis	12.80	12.80	12.80	15.80
Aluminum, virgin ingot	28.10	28.10	28.10	27.10
Nickel, electroytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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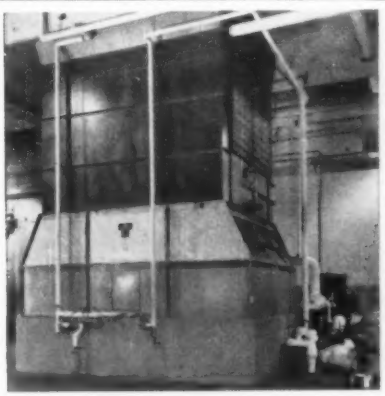

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Is Market Finally Off Bottom?

Upward trend continues. Price increases are gentle and not based on major mill sales.

Trade is in a speculative mood, hoping that prices will continue climbing.

▪ Prices continue to edge upward, but mostly on suspicion that new orders will bring higher prices.

This suspicion tends to be continued with nearly every purchase. Major mills are generally still out of the market. When even small purchases are made, however, they bring $1 or $2 over last quotations.

Even without significant orders to back up higher prices, the market appears to be off the bottom and moving upward gently.

Dealers are bidding on industrial or other tonnages at prices that indicate they are confident of a steady upward trend. No one is talking about a real rebounding. Continued low operating rates prevent optimism from getting out of hand. But the trade is taking the small upward movement as an indication of better things to come.

Price increases are scattered. Secondary grades are also stronger, but not everywhere. To date, blast furnace grades have shown little strength, with little indication of any showing up in the near future.

On the basis of higher prices in Pittsburgh and Chicago, The IRON AGE No. 1 Heavy Melting Composite rose to $35, up from $34.33 a week ago.

Pittsburgh—Prices of openhearth grades are up $1 as a stronger speculative element has entered the market. Mills show little interest in buying at any price, but brokers are talking optimism and strength. In line with the improvement in dealer openhearth grades, prices of low phos, factory bundles, and No. 1 railroad heavy melting are up $1. Prices of blast furnace grades are unchanged as yards continue to buy moderate tonnages of machine shop turnings at $17.

Chicago—While major mills continued to hold back, smaller mills made scattered purchases in light tonnages to move the market up again slightly. Older orders continued to force prices up, with dealers holding out in expectation of even stronger activity later this year.

Philadelphia—A mill purchase of openhearth scrap brought price increases of $1 for No. 2 heavy melting and No. 2 bundles. Otherwise this market is quiet. Prospects of increased export activity next month give rise to optimism. Dealers bidding on Navy Yard lists paid prices that indicate they will have to sell for higher than the current market to realize a profit.

New York — Openhearth grade prices rose sharply in this area following increases in adjacent districts. Top for No. 1 heavy melting is now $31, for No. 2, $29, and for No. 2 bundles, $24.

Detroit—Dealers are trying hard to find a sunny side to the market. While there is little mill support for optimism, they reason that lower generation of scrap by the auto industry will raise the price a few dollars this month. This has caused prices to move up slightly on appraisal.

Cleveland—Tone of the market is improved as dealers are becoming bullish, but mills continue to be uninterested. Dealers are carrying considerable inventory including production lists on speculation so any large scale order would probably raise prices.

St. Louis—Although demand is light, the supply is even less, causing an advance of $2 in rails and a heavy railroad list brought $1 more for No. 1 railroad heavy melting. Steel mills are buying sparingly, but movement to dealers is so small that prices for most grades are holding.

Birmingham—Some foundry and electric furnace scrap moved in the district this week, but brokers were having difficulty filling orders for openhearth grades. The cast market in Birmingham is quiet, but there is some action on the fringes of the district.

Cincinnati — Some out-of-town strength moved secondary grades up 50¢ to $1, but dealers continue to hold out for their price in local markets. Some secondary grades can be shipped upriver and some cast grades are being shipped to the South.

Buffalo—The market is inactive and prices unchanged. Dealer inventories are a little higher than when the slump began. A sale is not expected until the middle of next month. Dealers feel that prices may go slightly higher.

Boston—A substantially stronger tone to the market resulted in a $3 price increase for No. 1 grades. The trade would like to see more action, but is convinced that the market is tending to firm up.

West Coast—Prices are firm at present levels. Opinion is strong that scrap prices may have hit bottom. However, a major mill will cut back drastically for repairs in February.

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MIDWEST — Material is handled more efficiently . . . less time is required with this Allis-Chalmers 6,000-lb lift truck. With rotating device, it handles foundry sand, other bulk materials.

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See your Allis-Chalmers dealer soon. Have him give you the facts on lift trucks with capacities ranging from 2,000 to 10,000 lb — better still, ask him for a demonstration in your foundry.

WEST — Bundles of scrap are handled in the yard, moved to charging area with this 6,000-lb lift truck. The operator "spots" loads quickly because the truck maneuvers so easily in tight quarters.

EASTERN — On indoor or outdoor handling, this 4,000-lb lift truck works fast, drives easily, turns in 72-in. radius to move castings easily.

GREAT LAKES — Inventory was simplified — storage space better utilized because of tons-at-a-time tiering with this 6,000-lb lift truck. It also makes possible real savings on other handling.

NORTH — Over 6,000 hours of trouble-free operation with these Allis-Chalmers 4,000-lb lift trucks caused this foundry to add several more of the same trucks to their fleet.

CENTRAL — Handling time was reduced 30% on materials moved by this and another Allis-Chalmers lift truck. They saved 90% of the time formerly required to unload refractory brick.

MATERIAL HANDLING DEPARTMENT, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

BH-61A

SCRAP PRICES *(Effective Jan. 28, 1958)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	33.00 to 34.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	29.00 to 30.00
No. 1 busheling	33.00 to 34.00
Machine shop turn.	16.00 to 17.00
Mixed bor. and ms. turn.	16.00 to 17.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	20.00 to 21.00
Low phos. punch'gs plate	37.00 to 38.00
Heavy turnings	32.00 to 33.00
No. 1 RR hvy. melting	37.00 to 38.00
Scrap rails, random lgth.	47.00 to 48.00
Rails 2 ft and under	54.00 to 55.00
RR steel wheels	45.00 to 46.00
RR spring steel	45.00 to 46.00
RR couplers and knuckles	45.00 to 46.00
No. 1 machinery cast.	49.00 to 50.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	37.00 to 38.00

Chicago

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 dealer bundles	33.00 to 34.00
No. 1 factory bundles	37.00 to 38.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	17.00 to 18.00
Mixed bor. and turn.	19.00 to 20.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Low phos. forge crops	48.00 to 49.00
Low phos. punch'gs plate	44.00 to 45.00
Low phos. 3 ft and under	42.00 to 43.00
No. 1 RR hvy. melting	37.00 to 38.00
Scrap rails, random lgth.	46.00 to 47.00
Rerolling rails	52.00 to 53.00
Rails 2 ft and under	55.00 to 56.00
Locomotive tires cut	47.00 to 48.00
Cut bolsters & side frames	44.00 to 45.00
Angles and splice bars	49.00 to 50.00
RR steel car axles	51.00 to 52.00
RR couplers and knuckles	46.00 to 47.00
No. 1 machinery cast.	47.00 to 48.00
Cupola cast.	41.00 to 42.00
Heavy breakable cast.	39.00 to 40.00
Cast iron brake shoe	39.00 to 40.00
Cast iron wheels	38.00 to 39.00
Malleable	52.00 to 53.00
Stove plate	39.00 to 40.00
Steel car wheels	47.00 to 48.00

Philadelphia Area

No. 1 hvy. melting	$37.50 to $38.50
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	37.50 to 38.50
No. 2 bundles	27.00 to 28.00
No. 1 busheling	37.50 to 38.50
Machine shop turn.	20.00 to 21.00
Mixed bor. short turn.	21.00 to 22.00
Cast iron borings	22.00 to 23.00
Shoveling turnings	22.00 to 23.00
Clean cast. chem. borings	30.00 to 31.00
Low phos. 5 ft and under	39.00 to 40.00
Low phos. 2 ft and under	40.00 to 41.00
Low phos. punch'gs	40.00 to 41.00
Elec. furnace bundles	37.50 to 38.50
Heavy turnings	30.00 to 31.00
RR steel wheels	45.00 to 46.00
RR spring steel	45.00 to 46.00
Rails 18 in. and under	58.00 to 60.00
Cupola cast.	36.00 to 38.00
Heavy breakable cast.	39.00 to 40.00
Cast iron car wheels	40.00 to 41.00
Malleable	55.00 to 56.00
Unstripped motor blocks	32.00 to 33.00
No. 1 machinery cast.	47.00 to 48.00

Cleveland

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	28.00 to 29.00
No. 1 factory bundles	31.00 to 32.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	28.00 to 29.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Cut struct'r'l & plates, 2 ft & under	36.00 to 37.00
Drop forge flashings	28.00 to 29.00
Low phos. punch'gs, plate	29.00 to 30.00
Foundry steel, 2 ft & under	33.00 to 34.00
No. 1 RR heavy melting	34.00 to 35.00
Rails 2 ft and under	54.00 to 55.00
Rails 18 in. and under	55.00 to 56.00
Railroad grate bars	15.00 to 16.00
Steel axle turnings	16.00 to 17.00
Railroad cast.	46.00 to 47.00
No. 1 machinery cast.	45.00 to 46.00
Stove plate	42.00 to 43.00
Malleable	57.00 to 58.00

Youngstown

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	25.00 to 26.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. plate	35.00 to 36.00

Buffalo

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	25.50 to 26.50
No. 1 busheling	28.00 to 29.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	22.50 to 23.50
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	14.00 to 15.00
Low phos. plate	34.00 to 35.00
Scrap rails, random lgth.	40.00 to 41.00
Rails 2 ft and under	50.00 to 51.00
RR steel wheels	37.00 to 38.00
RR spring steel	33.00 to 34.00
RR couplers and knucklers	33.00 to 34.00
No. 1 machinery cast.	40.00 to 41.00
No. 1 cupola cast.	34.00 to 35.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	22.00 to 23.00
Drop forge flashings	20.00 to 21.00
Machine shop turn.	7.00 to 8.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	9.00 to 10.00
Low phos. punch'gs plate	20.00 to 21.00
No. 1 cupola cast.	29.00 to 30.00
Heavy breakable cast.	24.00 to 25.00
Stove plate	24.00 to 25.00
Automotive cast.	32.00 to 33.00

St. Louis

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	14.00 to 15.00
Cast iron borings	16.00 to 17.00
Shoveling turnings	17.00 to 18.00
No. 1 RR hvy. melting	35.00 to 36.00
Rails, random lengths	44.00 to 45.00
Rails, 18 in. and under	50.00 to 51.00
Angles and splice bars	40.00 to 41.00
Std. steel car axles	43.00 to 44.00
RR specialties	42.00 to 43.00
Cupola cast.	44.00 to 45.00
Heavy breakable cast.	32.00 to 33.00
Cast iron brake shoes	37.00 to 38.00
Stove plate	37.00 to 38.00
Cast iron car wheels	32.00 to 33.00
Rerolling rails	48.00 to 49.00
Unstripped motor blocks	32.00 to 33.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	17.00 to 18.00
No. 1 busheling	23.00 to 24.00
Elec. furnace, 3 ft & under	29.00 to 30.00
Machine shop turn.	8.50 to 9.50
Mixed bor. and short turn.	9.50 to 10.50
Shoveling turnings	10.00 to 11.00
Clean cast. chem. borings	16.00 to 17.00
No. 1 machinery cast.	32.00 to 33.00
Mixed cupola cast.	27.00 to 28.00
Heavy breakable cast.	27.00 to 28.00
Stove plate	26.00 to 27.00
Unstripped motor blocks	26.00 to 27.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	28.00 to 29.00
No. 2 dealer bundles	23.00 to 24.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	15.00 to 16.00
Clean cast. chem. borings	23.00 to 24.00
No. 1 machinery cast.	34.00 to 35.00
Mixed yard cast.	29.00 to 30.00
Charging box cast.	30.00 to 31.00
Heavy breakable cast.	30.00 to 31.00
Unstripped motor blocks	27.00 to 28.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	22.00 to 23.00
Shoveling turnings	23.00 to 24.00
Cast iron borings	12.00 to 13.00
Electric furnace bundles	36.00 to 37.00
Elec. furnace, 3 ft & under	35.00 to 36.00
Bar crops and plate	39.00 to 40.00
Structural and plate, 3 ft	39.00 to 40.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth.	41.00 to 42.00
Rails, 18 in. and under	48.00 to 49.00
Angles & splice bars	42.00 to 43.00
Rerolling rails	48.00 to 49.00
No. 1 cupola cast.	49.00 to 50.00
Stove plate	48.00 to 49.00
Charging box cast.	22.00 to 23.00
Cast iron car wheels	36.00 to 37.00
Unstripped motor blocks	39.00 to 40.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	23.00 to 24.00
Machine shop turn	13.00 to 14.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	15.00 to 16.00
Low phos., 18 in. and under	37.00 to 38.00
Rails, random length	43.00 to 44.00
Rails, 18 in. and under	53.00 to 54.00
No. 1 cupola cast.	38.00 to 39.00
Hvy. breakable cast.	33.00 to 34.00
Drop broken cast.	47.00 to 48.00

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	28.00
No. 2 bundles	22.00
Machine shop turn.	15.00
Cast iron borings	15.00
No. 1 RR hvy. melting	32.00
No. 1 cupola cast.	42.00

Los Angeles

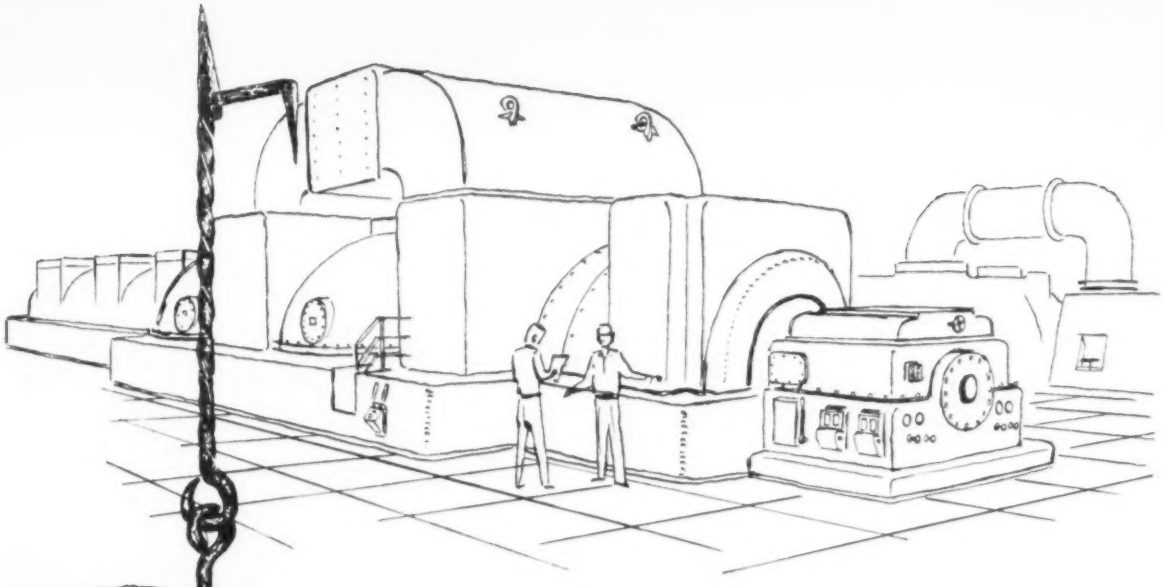
No. 1 hvy. melting	$32.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	28.00
No. 2 bundles	20.00
Machine shop turn.	9.00
Shoveling turnings	11.00
Cast iron borings	11.00
Elec. furn. 1 ft and under (foundry)	43.00
No. 1 RR hvy. melting	32.00
No. 1 cupola cast	38.00

Seattle

No. 1 hvy. melting	$30.00
No. 2 hvy. melting	28.00
No. 2 bundles	24.00
No. 1 cupola cast	36.00
Mixed yard cast.	36.00

Hamilton, Ont.

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	27.00
No. 1 dealer bundles	32.00
No. 2 bundles	22.00
Mixed steel scrap	27.00
Busheling	22.00
Bush., new fact, prep'd	32.00
Bush., new fact, unprep'd	26.00
Machine shop turn.	17.00
Short steel turn.	21.00
Mixed bor. and turn.	17.00
Rails, rerolling	41.00
Cast scrap	$44.00 to 47.00



Lamp Lighters

Lamps originated with the cave man who first lighted a rush and thrust it into a shell, hollowed stone or animal's skull filled with melted fat. The Greeks improved design and illuminating power with their lamps of clay or metal —Diogenes lighted his to search for an honest man.

In the Roman Empire, the iron Crusie with its hook and spike was used in such widely separated places as Britain and Pompeii.

After hundreds of years, the Crusie was followed by the Betty, a lamp constructed of sheet iron, cast iron, brass, copper or pewter, in common use until past the middle of the 19th Century. Then came the electric arc light, developed between 1878 and 1883, and Edison's incandescent lamp introduced in 1879.

For modern lamp lighting, the country's utilities utilize millions of tons of iron and steel for great dynamos, generators and other equipment . . . These and countless other expanding needs demand an inexhaustible supply of steel—and scrap is a major ingredient.

For the purchase or sale of iron or steel scrap . . .

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Diecasters Expect A Good Year

Diecasters say 1957 was a profitable year, expect to do as well or better in 1958.

New output high predicted for aluminum castings.

Zinc will be off slightly, but zinc industry is expected to pitch in with promotion and research.

■ The sag in overall business conditions does not appear to be hitting diecasters with the same impact as other branches of metalworking.

The American Die Casting Institute reports production of aluminum diecastings in 1957 hit a new high, and output of zinc diecastings was topped only by the record year 1955.

The Institute, representing custom diecasters, predicts sales of aluminum castings in 1958 will again hit a new high, while zinc will fall only about 8 pct.

	Aluminum	Zinc
1958	197,500	347,000
1957	186,500	377,000

(Net Tons)

The diecasters are counting on the zinc industry to help. The goal is price stability. The answer, according to ADCI is "proper and aggressive promotion of the physical and economic advantages of zinc die castings."

Says the Institute, "The diecasters feel strongly that this is the positive approach to price stability rather than the ill-advised proposals of the zinc industry to have the government place a floor on zinc prices through inequitable high tariffs and import quotas."

Plan Research Project—The zinc industry is now planning a major research program. What form it will take and what the major aims will be is still being debated within the zinc industry. But it appears that at least part will be aimed directly at helping diecasters.

The outstanding performance in 1957, and predicted for 1958, even in the face of an overall business recession, is attributed to the increased use of discastings per consuming product. This is particularly true for aluminum diecastings.

Auto Market — The average weight of aluminum die castings in 1958 autos, its biggest market, is figured at 36.1 lb by the Institute. Total in 1957 models was 30.4 lb.

A drop in the amount of zinc diecastings per car in 1958, along with the anticipated lower auto production, probably accounts for almost all the ground zinc is expected to lose in 1958. ADCI says there will be an average of 72.5 lb of zinc diecasting in 1958 models, compared with 73.9 lb in 1957 cars.

Production Cutbacks

Despite talk of higher tariffs and import quotas, all nonferrous markets remain weak. Several companies took the bull by the horns last week and announced production cutbacks.

Market observers concede that it is still too early to gage the effects of the latest round of cutbacks. But no firming is apparent yet.

Here's a roundup of the latest cutbacks:

Copper—Phelps Dodge will decrease production at its Arizona mines by about 9 pct. Production had previously been cut in October 1956, and April and October 1957. Robert G. Page, Phelps Dodge president, says the cumulative output cut in Arizona is about 22 pct.

Zinc—Blackwell Zinc Co., Inc., a subsidiary of American Metal Climax, Inc., is producing from only 10 furnace blocks. Until last week it had been turning out zinc from 13. The move will mean a drop of about 2000 tons of zinc per month.

The previous week, American Zinc, Lead and Smelting Co. announced its slab zinc output during the first quarter will be 25 pct below the comparable period in 1957.

Aluminum — Aluminium Ltd., major Canadian producers, will operate its smelters at 80 pct of capacity. It has been operating at about 90 pct.

About one-third of Aluminium's output is sold in the U. S.

Affected will be the world's largest aluminum smelter at Arvida, Quebec, and Shawinigen Falls, Quebec.

Tin prices for the week: Jan. 22—92.50; Jan. 23—92.50; Jan. 24—93.75; Jan. 27—94.00; Jan. 28—94.00.*

*Estimate.

Primary Prices

(cents per lb)	Current price	last price	date of change
Aluminum pig	26.00	25.00	8/1/57
Aluminum ingot	28.10	27.10	8/1/57
Copper (E)	25.00	27.00	1/13/58
Copper (CS)	24.00	24.50	1/21/57
Copper (L)	25.00	27.00	1/13/58
Lead, St. L.	12.80	13.30	12/2/57
Lead, N. Y.	13.00	13.50	12/2/57
Magnesium ingot	36.00	34.09	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/56
Titanium sponge	165-250	165-225	5/5/57
Zinc, E. St. L.	10.00	10.50	7/1/57
Zinc, N. Y.	10.50	11.00	7/1/57

ALUMINUM: 99% ingot frt allwd. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig, Velasco, Tex. NICKEL: Port Colbourne, Canada. ZINC: prime western. TIN: see above; other primary prices, pg. 140.

Designed for your Cutting Tool Program...

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CARMET TOOL HOLDERS and INDEXABLE INSERTS

Expanded to 16 pages, this latest edition contains specifications of Carmet tool holders and Indexable inserts, replacement parts for tool holders, and information on choosing the proper carbide grade for the job.

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Branch offices and distributors in all principal cities

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate
("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3
1100, 3003	46.6	44.3	43.6	42.7
5052	54.0	48.9	47.2	45.4
6061-0	51.4	47.0	45.2	45.1

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6-8	45.0-46.8	60.4-64.1
12-14	45.7-47.2	61.3-65.8
24-26	49.0-49.5	72.1-76.8
36-38	58.0-58.6	96.2-99.8

Screw Machine Stock—2011-T-3

Size"	¼	⅝-⅝	¾-1	1¼-1½
Price	63.0	62.5	61.0	58.6

Roofing Sheet, Corrugated
(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.420	$1.893	$2.367	$2.839
.024 gage	1.774	2.366	2.957	3.549

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250-3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	108.1
AZ31B Spec.	.....	93.3	95.7	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

Factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	126	106	128
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	120	105	121
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	48.13	.....	45.36	48.32
Brass, 70/30	42.69	43.23	42.63	45.60
Brass, Low	44.90	45.44	44.84	47.71
Brass, R.L.	45.67	46.21	45.61	48.48
Brass, Naval	47.07	.....	41.38	50.48
Muntz Metal	45.19	.....	41.00	.....
Comm. Bz.	46.98	47.52	46.92	49.54
Mang. Bz.	50.81	.....	44.91	.....
Phos. Bz. 5%	67.17	.....	67.67	.....

Free Cutting Brass Rod 31.03

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $9.50-$10.60; alloy, $14.75; Plate, HR, commercially pure, $8.00-$8.75; alloy, $10.75. Wire, rolled and/or drawn, commercially pure, $7.50-$8.00; alloy, $10.00; Bar, HR or forged, commercially pure, $6.15-$6.40; alloy, $6.15-$6.35; billets, HR, commercially pure, $6.00-$6.25; alloy, $6.00-$6.20.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. $3.50
Beryllium aluminum 5% Be, Dollar per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.55
Calcium, 99.9%, small lots ..... $ 4.55
Chromium, 99.8% metallic basis ... $ 1.31
Cobalt, 97-99% (per lb) .... $2.00 to $2.07
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 39.50 to 53.50
Gold, U. S. Treas, per troy oz. $35.00
Indium, 99.9%, dollars per troy oz... $ 2.25
Iridium, dollars per troy oz..... $80 to $90
Lithium, 98% ..... $11.00 to $14.00
Magnesium, sticks, 100 to 500 lb.... 59.00
Mercury, dollars per 76-lb flask, f.o.b. New York ..... $220 to $225
Nickel oxide sinter at Copper Cliff, Ont., contained nickel 71.25
Palladium, dollars per troy oz... $19 to $21
Platinum, dollars per troy oz... $77 to $80
Rhodium ..... $120.00 to $125.00
Silver ingots (¢ per troy oz.) 88.625
Thorium, per kg. $43.00
Vanadium ..... $ 3.45
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 25.75
No. 120 ..... 24.75
No. 123 ..... 24.00
80-10-10 ingot
No. 305 ..... 29.75
No. 315 ..... 27.75
88-10-2 ingot
No. 210 ..... 36.75
No. 215 ..... 32.50
No. 245 ..... 29.25
Yellow ingot
No. 405 ..... 21.25
Manganese bronze
No. 421 ..... 23.00

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 25.25-26.25
0.60 copper max. 25.00-26.00
Piston alloys (No. 122 type) .. 23.75-24.50
No. 12 alum. (No. 2 grade) 21.50-22.25
108 alloy 21.75-22.75
195 alloy 24.50-26.00
13 alloy (0.60 copper max.) .. 25.00-26.00
AXS-679 ..... 21.75-22.75

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97½% 22.50-23.50
Grade 2—92-95% 21.25-22.00
Grade 3—90-92% 20.00-21.00
Grade 4—85-90% 18.00-18.75

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	21	20¼
Yellow brass	16⅛	14½
Red brass	18⅝	17⅞
Comm. bronze	19¼	18½
Mang. bronze	14⅞	14⅛
Yellow brass rod ends	15⅝	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 19
No. 2 copper wire 17½
Light copper 15¼
*Refinery brass 17
Copper bearing material 16½
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 19
No. 2 copper wire 17½
Light copper 15¼
No. 1 composition 17½
No. 1 comp. turnings 17
Hvy. yellow brass solids ... 12
Brass pipe 13⅜
Radiators 13½

Aluminum

Mixed old cast. ..... 12½—13½
Mixed new clips ..... 15 —16
Mixed turnings, dry ..... 13½—14½

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 17 —17½
No. 2 copper wire ..... 15 —15½
Light copper ..... 13 —13½
Auto radiators (unsweated) .. 11 —11½
No. 1 composition ..... 14½—15
No. 1 composition turnings... 13½—14
Cocks and faucets ..... 11½—12
Clean heavy yellow brass ... 11 —11½
Brass pipe ..... 12 —12⅛
New soft brass clippings .... 12½—13
No. 1 brass rod turnings .... 10 —10½

Aluminum

Alum. pistons and struts .... 5½— 6
Aluminum crankcases ..... 10 —10½
1100 (2S) aluminum clippings 13 —13½
Old sheet and utensils ..... 10 —10⅛
Borings and turnings ..... 6½— 7
Industrial castings ..... 10 —10⅛
2024 (24S) clippings ..... 11½—12

Zinc

New zinc clippings ..... 4 — 4⅛
Old zinc ..... 3 — 3⅛
Zinc routings ..... 1¾— 2
Old die cast scrap ..... 1½— 1¾

Nickel and Monel

Pure nickel clippings 42-45
Clean nickel turnings 37-40
Nickel anodes 42-45
Nickel rod ends 42-45
New Monel clippings 28-29
Clean Monel turnings 20-23
Old sheet Monel 25-26
Nickel silver clippings, mixed. 18
Nickel silver turnings, mixed. 15

Lead

Soft scrap lead ..... 8½— 9
Battery plates (dry) ..... 3½— 3¾
Batteries, acid free ..... 2½— 2¾

Miscellaneous

Block tin ..... 75 —76
No. 1 pewter ..... 59 —60
Auto babbitt ..... 39 —40
Mixed common babbitt ..... 11 —11⅛
Solder joints ..... 14½—15
Siphon tops 42
Small foundry type ..... 12 —12¼
Monotype ..... 12 —12¼
Lino. and stereotype ..... 11 —11¼
Electrotype ..... 10 —10¼
Hand picked type shells ..... 7 — 7½
Lino. and stereo. dross ..... 3 — 3¼
Electro dross ..... 2½— 2¾

(Effective Jan. 27, 1958)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$114.00 *B3*		5.325 *B3*	7.80 *B3*	5.325 *B3*						
	Buffalo, N. Y.	$77.50 *R3, B3*	$96.00 *R3, B3*	$114.00 *R3, B3*	6.225 *B3*	5.325 *B3*	7.80 *B3*	5.325 *B3*	4.925 *R3, B3*	7.15 *S10*	7.325 *B3*			
	Phila., Pa.									7.70 *P15*				
	Harrison, N. J.													15.05 *C11*
	Conshohocken, Pa.		$101.00 *A2*	$121.00 *A2*					4.975 *A2*	7.20 *A2*	7.325 *A2*			
	New Bedford, Mass.									7.60 *R6*				
	Johnstown, Pa.	$77.50 *B3*	$96.00 *B3*	$114.00 *B3*		5.325 *B3*	7.80 *B3*							
	Boston, Mass.									7.70 *T8*				15.40 *T8*
	New Haven, Conn.									7.60 *D1*				
	Baltimore, Md.									7.15 *T8*				
	Phoenixville, Pa.					5.325 *P2*		5.325 *P2*						
	Sparrows Pt., Md.								4.925 *B3*		7.325 *B3*			
	Bridgeport, Wallingford, Conn.			$114.00 *N8*						7.60 *W1*				
	Pawtucket, R. I. Worcester, Mass.									7.70 *N7* 7.70 *A5*				15.40 *N7* 15.20 *T8*
MIDDLE WEST	Alton, Ill.								5.125 *L1*					
	Ashland, Ky.								4.925 *A7*					
	Canton-Massillon, Dover, Ohio		$96.00 *R3*	$114.00 *R3, T5*						7.15 *G4*		10.45 *G4*		14.85 *C11*
	Chicago, Ill. Franklin Park, Ill. Evanston, Ill.	$77.50 *U1, R3*	$96.00 *U1, R3,W8*	$114.00 *U1, R3,W8*	6.225 *U1*	5.275 *U1, W8,P13*	7.75 *U1,Y1 W8*	5.275 *U1*	4.925 *W8, N4,A1*	7.25 *A1,T8 M8*			8.10 *W8, S9,I3*	15.05 *A1, S9,G4*
	Cleveland, Ohio									7.15 *A5,J3*		10.45 *A5*	8.10 *J3*	
	Detroit, Mich.			$114.00 *R5*					5.025 *G3, M2*	7.25 *M2,D1, D2,G3,P11*	7.425 *G3*	10.60 *D2* 10.55 *G3*	8.10 *G3*	
	Anderson, Ind.									7.15 *G4*				
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$77.50 *U1*	$96.00 *U1*	$114.00 *U1, Y1*		5.275 *U1, I3*	7.75 *U1, I3*	5.275 *I3*	4.925 *U1, I3,Y1*	7.15 *Y1*	7.325 *U1, I3,Y1*	10.60 *Y1*	8.10 *U1, Y1*	
	Sterling, Ill.	$77.50 *N4*				5.275 *N4*			5.025 *N4*					
	Indianapolis, Ind.									7.30 *J3*				15.20 *J3*
	Newport, Ky.												8.10 *A9*	
	Middletown, Ohio													
	Niles, Warren, Ohio Sharon, Pa.		$96.00 *S1, C10*	$114.00 *C10,S1*					4.925 *R3, S1*	7.15 *R3,T4 S1*	7.325 *R3, S1*	10.50 *S1* 10.45 *R3*	8.10 *S1*	15.05 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Aliquippa, Pa.	$77.50 *U1, P6*	$96.00 *U1, C11,P6*	$114.00 *U1, C11,B7*	6.225 *U1*	5.275 *U1, J3*	7.75 *U1, J3*	5.275 *U1*	4.925 *P6*	7.15 *J3,B4, S7*			8.10 *S9*	15.05 *S9*
	Weirton, Wheeling, Follansbee, W. Va.				6.225 *W3*	5.275 *W3*			4.925 *W3*	7.15 *W3,F3*	7.325 *W3*	10.50 *W3*		
	Youngstown, Ohio	$77.50 *R3*	$96.00 *Y1, C10*	$114.00 *Y1*			7.75 *Y1*			7.15 *Y1,J3*	7.325 *U1, Y1*	10.65 *Y1*	8.10 *U1, Y1*	15.05 *J3* 10.65 *Y1*
WEST	Fontana, Cal.	$88.00 *K1*	$105.50 *K1*	$135.00 *K1*		6.075 *K1*	8.55 *K1*	6.225 *K1*	5.675 *K1*	9.00 *K1*				
	Geneva Utah		$96.00 *C7*			5.275 *C7*	7.75 *C7*							
	Kansas City, Mo.					5.375 *S2*	7.85 *S2*						8.35 *S2*	
	Los Angeles, Torrance, Cal.		$105.50 *B2*	$134.00 *B2*		5.975 *C7, B2*	8.45 *B2*		5.675 *C7, B2*	9.05 *J3*			9.30 *B2*	17.25 *J3*
	Minnequa, Colo.					5.575 *C6*			6.025 *C6*	9.10 *K1*				
	Portland, Ore.					6.025 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$105.50 *B2*			5.925 *B2*	8.40 *B2*		5.675 *C7, B2*					
	Seattle, Wash.		$109.50 *B2*			6.025 *B2*	8.50 *B2*		5.925 *B2*					
SOUTH	Atlanta, Ga.					5.475 *A8*			5.125 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$77.50 *T2*	$96.00 *T2*			5.275 *T2, R3,C16*	7.75 *T2*		4.925 *T2, R3,C16*		7.325 *T2*			
	Houston, Lone Star, Texas		$101.00 *S2*	$119.00 *S2*		5.375 *S2*	7.85 *S2*						8.35 *S2*	

(Effective Jan. 27, 1958)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.			Cokes* *1.25*-lb. base box	Electro* *0.25*-lb. base box	Holloware Enameling *29* ga.
EAST	Bethlehem, Pa.											† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		
	Buffalo, N. Y.	4.925 *B3*	6.05 *B3*				7.275 *B3*	8.975 *B3*		6.15 *W6*				
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.	4.975 *A2*	6.10 *A2*				7.325 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.									6.15 *B3*				
	Fairless, Pa.	4.975 *U1*	6.10 *U1*				7.325 *U1*	9.025 *U1*				$10.15 *U1*	$8.85 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.925 *B3*	6.05 *B3*	6.60 *B3*			7.275 *B3*	8.975 *B3*	9.725 *B3*	6.25 *B3*		$10.15 *B3*	$8.85 *B3*	
	Worcester, Mass.									6.45 *A5*				
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.									6.35 *L1*				
	Ashland, Ky	4.925 *A7*		6.60 *A7*	6.625 *A7*									
	Canton-Massillon, Dover, Ohio			6.60 *R3, R1*										
	Chicago, Joliet, Ill.	4.925 *W8, A1*					7.275 *U1*			6.15 *A5, R3,W8, N4, K2*				
	Sterling, Ill.									6.25 *N4, K2*				
	Cleveland, Ohio	4.925 *R3, J3*	6.05 *R3, J3*		6.625 *R3*		7.275 *R3, J3*	8.975 *R3, J3*		6.15 *A5*				
	Detroit, Mich.	5.025 *G3, M2*	6.15 *G3* 6.05 *M2*				7.375 *G3*	9.075 *G3*						
	Newport, Ky	4.925 *A1*	6.05 *A1*											
	Gary, Ind. Harbor, Indiana	4.925 *U1, I3,Y1*	6.05 *U1, I3,Y1*	6.60 *U1, I3*	6.625 *U1, I3,Y1*	7.00 *U1*	7.275 *U1, Y1,I3*	8.975 *U1, Y1*		6.15 *Y1*		$10.05 *U1, Y1*	$8.75 *I3, U1,Y1*	7.50 *U1, Y1*
	Granite City, Ill.	5.125 *G2*	6.25 *G2*	6.80 *G2*	6.825 *G2*								$8.85 *G2*	7.60 *G2*
	Kokomo, Ind.			6.70 *C9*						6.25 *C9*				
	Mansfield, Ohio		6.05 *E2*			7.00 *E2*								
	Middletown, Ohio		6.05 *A7*	6.60 *A7*	6.625 *A7*	7.00 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	4.925 *R3, N3,S1*	6.05 *R3*	6.60 *R3*	6.625 *N3, S1*	7.00 *N3, S1,R3*	7.275 *R3*	8.975 *S1, R3*					$8.75 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Donora, Pa. Aliquippa, Pa.	4.925 *U1, J3,P6*	6.05 *U1, J3,P6*	6.60 *U1, J3*	6.625 *U1*		7.275 *U1, J3*	8.975 *U1, J3*	9.725 *U1*	6.15 *A5, J3,P6*		$10.05 *U1, J3*	$8.75 *U1, J3*	7.50 *U1, J3*
	Portsmouth, Ohio	4.925 *P7*	6.05 *P7*							6.15 *P7*				
	Weirton, Wheeling, Follansbee, W. Va.	4.925 *W3, W5*	6.05 *W3, F3,W5*	6.60 *W3, W5*		7.00 *W3, W5*	7.275 *W3*	8.975 *W3*				$10.05 *W5, W3*	$8.75 *W5, W3*	7.50 *W5*
	Youngstown, Ohio	4.925 *U1, Y1*	6.05 *Y1*		6.625 *Y1*		7.275 *Y1*	8.975 *Y1*		6.15 *Y1*				
WEST	Fontana Cal.	5.675 *K1*	7.30 *K1*				8.025 *K1*	10.275 *K1*				$10.80 *K1*	$9.50 *K1*	
	Geneva, Utah	5.025 *C7*												
	Kansas City, Mo.									6.40 *S2*				
	Los Angeles, Torrance, Cal.									6.95 *B2*				
	Minnequa, Colo.									6.40 *C6*				
	San Francisco, Niles, Pittsburgh, Cal.	5.625 *C7*	7.00 *C7*	7.35 *C7*						6.95 *C7*		$10.80 *C7*	$9.50 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.925 *T2, R3*	6.05 *T2, R3*	6.60 *T2, R3*						6.15 *T2, R3*		$10.15 *T2*	$8.85 *T2*	
	Houston, Tex.									6.40 *S2*				

(Effective Jan. 27, 1958)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfrs'. Bright
EAST	Bethlehem, Pa.				6.475 *B3*	8.775 *B3*	7.925 *B3*					
	Buffalo, N. Y.	5.425 *R3,B3*	5.425 *R3,B3*	7.35 *B5*	6.475 *B3,R3*	8.775 *B3,B5*	7.925 *B3*	5.10 *B3*		7.20 *B3*		7.65 *W6*
	Claymont, Del.							5.10 *C4*		7.20 *C4*	7.625 *C4*	
	Coatesville, Pa.							5.10 *L4*		7.20 *L4*	7.925 *L4*	
	Conshohocken, Pa.							5.20 *A2*	6.175 *A2*	7.20 *A2*	7.625 *A2*	
	Harrisburg, Pa.							5.10 *P2*	6.275 *P2*			
	Milton, Pa.	5.575 *M7*	5.575 *M7*									
	Hartford, Conn.			7.80 *R3*		9.075 *R3*	7.925 *B3*					
	Johnstown, Pa.	5.425 *B3*	5.425 *B3*		6.475 *B3*			5.10 *B3*		7.20 *B3*	7.625 *B3*	7.65 *B3*
	Fairless, Pa.	5.575 *U1*	5.575 *U1*		6.625 *U1*							
	Newark, N. J. Camden, N. J.			7.75 *W10* 7.75 *P10*		8.95 *W10* 8.95 *P10*						
	Bridgeport, Conn. Putnam, Conn. Willimantic, Conn.			7.85 *W10* 7.80 *J3*	6.55 *N8*	8.925 *N8*						
	Sparrows Pt., Md.		5.425 *B3*					5.10 *B3*		7.20 *B3*	7.625 *B3*	7.75 *B3*
	Palmer, Worcester, Readville, Mass. Mansfield, Mass.			7.85 *B5,C14*		9.075 *A5,B5*						7.95 *A5, W6*
	Spring City, Pa.			7.75 *K4*		8.95 *K4*						
MIDDLE WEST	Alton, Ill.	5.625 *L1*										7.85 *L1*
	Ashland,Newport,Ky.							5.10 *A7, A1*		7.20 *A1*		
	Canton, Massillon, Ohio			7.30 *R3,R2*	6.475 *R3,T5*	8.775 *R3,R2, T5*						
	Chicago, Joliet, Waukegan, Ill. Harvey, Ill.	5.425 *U1,R3, W8,N4,P13*	5.425 *U1,R3, N4,P13*	7.30 *A5, W10,W8 B5,L2,N9*	6.475 *U1,R3, W8*	8.775 *A5, W10,W8 L2,N8,B5*	7.925 *U1,W8*	5.10 *U1,A1, W8,I3*	6.175 *U1*	7.20 *U1,W8*	7.625 *U1,W8*	7.65 *A5,R3, W8,N4, K2,W7*
	Cleveland, Ohio Elyria, Ohio	5.425 *R3*	5.425 *R3*	7.30 *A5,C13 C18*		8.775 *A5, C13, C18*	7.925 *R3*	5.20 *R3,J3*	6.175 *J3*		7.625 *R3, J3*	7.65 *A5, C13*
	Detroit, Mich.	5.525 *G3*	5.775 *G3*	7.55 *P3* 7.50 *P8,B5*	6.475 *R5* 6.575 *G3*	8.775 *R5* 8.975 *B5,P3, P8*	8.025 *G3*	5.20 *G3*		7.35 *G3*		
	Duluth, Minn.											7.65 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.425 *U1,I3, Y1*	5.425 *U1,I3, Y1*	7.30 *R3,J3*	6.475 *U1,I3, Y1*	8.775 *R3,M4*	7.925 *U1, Y1*	5.10 *U1,I3, Y1*	6.175 *J3,I3*	7.20 *U1,Y1*	7.625 *U1, Y1,I3*	7.75 *M4*
	Granite City, Ill.							5.30 *G2*				
	Kokomo, Ind											7.75 *C9*
	Sterling, Ill.	5.525 *N4*	5.525 *N4*					5.10 *N4*				7.75 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.30 *C10*	6.475 *C10,S1*	8.775 *C10*	7.925 *S1*	5.10 *R3,S1*		7.20 *S1*	7.625 *R3, S1*	
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.425 *U1,J3*	5.425 *U1,J3*	7.30 *A5,B4, R3,J3,C11, W10,S9,C8*	6.475 *U1,J3, C11,B7*	8.775 *A5, W10,R3,S9, C11,C8*	7.925 *U1,J3*	5.10 *U1,J3*	6.175 *U1*	7.20 *U1,J3, B7*	7.625 *U1,J3, B7*	7.65 *A5, J3,P6*
	Portsmouth, Ohio											7.65 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.10 *W5*				
	Youngstown, Ohio	5.425 *U1,R3, Y1*	5.425 *U1,R3, Y1*	7.30 *A5,Y1, F2*	6.475 *U1,Y1*	8.775 *Y1,F2*	7.925 *U1,Y1*	5.10 *U1,R3, Y1*		7.20 *Y1*	7.625 *U1, R3,Y1*	7.65 *Y1*
WEST	Emeryville, Cal. Fontana, Cal.	6.175 *J5* 6.125 *K1*	6.175 *J5* 6.125 *K1*		7.525 *K1*		8.625 *K1*	5.90 *K1*		8.00 *K1*	8.425 *K1*	
	Geneva, Utah							5.10 *C7*			7.625 *C7*	
	Kansas City, Mo.	5.675 *S2*	5.675 *S2*		6.725 *S2*		8.175 *S2*					7.90 *S2*
	Los Angeles, Torrance, Cal.	6.125 *C7,B2*	6.125 *C7,B2*	8.75 *R3,P14*	7.525 *B2*	10.65 *P14*	8.625 *B2*					8.60 *B2*
	Minnequa, Colo.	5.875 *C6*	5.875 *C6*					5.95 *C6*				7.90 *C6*
	Portland, Ore.	6.175 *O2*	6.175 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.125 *C7* 6.175 *B2*	6.125 *C7* 6.175 *B2*				8.675 *B2*					8.60 *C7,C6*
	Seattle Wash.	6.175 *B2,N6*	6.175 *B2*				8.675 *B2*	6.00 *B2*		8.10 *B2*	8.525 *B2*	
SOUTH	Atlanta, Ga.	5.625 *A8*	5.625 *A8*									7.85 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	5.425 *T2,R3, C16*	5.425 *T2,R3, C16,S11*	7.90 *C16*			7.925 *T2*	5.10 *T2,R3*			7.625 *T2*	7.65 *T2,R3*
	Houston, Ft. Worth, Lone Star, Tex.	5.675 *S2*	5.675 *S2*		6.725 *S2*		8.175 *S2*	5.20 *S2* 5.20 *L3*		7.30 *S2*	7.725 *S2*	7.90 *S2*

† Merchant Quality—Special Quality 35¢ higher.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 J. & L. Steel Co., Stainless Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Youngstown *R3*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Fontana *K1*	+8.25	+23.5	+5.25	+19.5	+1.75	+15.00	0.75	+14.25	1.25	+13.25	1.75	+12.75	3.25	+13.00								
Pittsburgh *J3*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Alton, Ill. *L1*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Sharon *M3*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Fairless *N2*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Pittsburgh *N1*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Wheeling *W5*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Wheatland *W4*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Youngstown *Y1*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Indiana Harbor *Y1*	4.25	+11.0	7.25	+7.0	10.75	+2.50	13.25	+1.75	13.25	+0.75	14.25	+0.25	15.75	+1.00								
Lorain *N2*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Youngstown *R3*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Fairless *N2*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Fontana *K1*	+3.75		0.25		3.25		3.75		4.25		4.75		5.25									
Pittsburgh *J3*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Alton, Ill. *L1*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Sharon *M3*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Pittsburgh *N1*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Wheeling *W5*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Wheatland *W4*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Youngstown *Y1*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Indiana Harbor *Y1*	8.75	+5.0	12.75	+1.0	15.75	3.50	16.25	2.25	16.75	3.25	17.25	3.75	17.75	2.50								
Lorain *N2*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50

Threads only, buttweld and seamless 2½ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 10¢ per lb.

(Effective Jan. 27, 1958)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.795	T-1
18	4	1	—	5	2.50	T-4
18	4	2	—	—	1.96	T-2
1.5	4	1.5	8	—	1.155	M-1
6	4	2	6	—	1.545	M-3
6	4	2	5	—	1.30	M-2

High-carbon chromium ..... .925 D-3, D-5
Oil hardened manganese ..... .475 O-2
Special carbon ..... .36 W-1
Extra carbon ..... .36 W-1
Regular carbon ..... .305 W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

		Plate (*A3, J2, L4, C4*)			Sheet (*I2*)
	Cladding	10 pct	15 pct	20 pct	20 pct
Stainless Type	302				37.50
	304	37.95	42.25	46.70	40.00
	316	44.40	49.50	54.50	58.75
	321	40.05	44.60	49.30	47.25
	347	42.40	47.55	52.80	57.00
	405	29.85	33.35	36.85	.....
	410	29.55	33.10	36.70	.....
	430	29.80	33.55	37.25	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 40.25; 1 side, 33.95.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.525	6.50	6.975				14.75
Cleveland *R3*							
So. Chicago *R3*				9.75			
Ensley *T2*	5.525	6.50					
Fairfield *T2*		6.50		9.75		6.60	
Gary *U1*	5.525					6.60	
Huntington *C16*		6.50					
Ind. Harbor *I3*	5.525		6.975	9.75		6.60	
Ind. Harbor *Y1*				9.75			
Johnstown *B3*		6.50					
Joliet *U1*			6.975				
Kansas City *S2*				9.75			14.75
Lackawanna *B3*	5.525	6.50	6.975			6.60	
Lebanon *B3*			6.975		14.50		14.75
Minnequa *C6*	5.525	7.00	6.975	9.75		6.60	14.75
Pittsburgh *P5*							14.75
Pittsburgh *J3*				9.75			
Seattle *B2*				10.25		6.75	15.75
Steelton *B3*	5.525		6.975			6.60	
Struthers *Y1*				9.75			
Torrance *C7*						6.75	
Williamsport *S5*		6.50					
Youngstown *R3*				9.75			

COKE

	Net-Ton
Furnace, beehive (f.o.b.) Connellsville, Pa.	$15.00 to $15.75
Foundry, beehive (f.o.b.)	$17.50 to $19.00
Foundry oven coke	
Buffalo, del'd	$31.75
Detroit, f.o.b.	30.50
New England, del'd	31.55
Kearney, N. J., f.o.b.	29.75
Philadelphia, f.o.b.	29.50
Swedeland, Pa., f.o.b.	29.50
Painesville, Ohio, f.o.b.	30.50
Erie, Pa., f.o.b.	30.50
Cleveland, del'd	32.65
Cincinnati, del'd	31.84
St. Paul, f.o.b.	29.75
St. Louis, f.o.b.	31.50
Birmingham, f.o.b.	28.85
Milwaukee, f.o.b.	30.50
Neville, Is., Pa.	29.25

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1957 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field		9.625	
Armature	11.10	10.85	11.35
Elect.	11.80	11.55	12.05
Special Motor		12.10	
Motor	12.90	12.65	13.15
Dynamo	13.95	13.70	14.20
Trans. 72	15.00	14.75	15.25
Trans. 65	15.55		
		Grain Oriented	
Trans. 58	16.05	Trans. 66	20.20
Trans. 52	17.10	Trans. 80	19.20
		Trans. 73	19.70

Producing points: Beech Bottom (*W5*); Brackenridge (*A5*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	26.00	40	100, 110	10.70
20	72	25.25	35	110	10.70
18	72	25.75	30	110	10.85
14	72	25.75	24	72 to 84	11.25
12	72	26.25	20	90	11.00
10	60	28.00	17	72	11.40
10	48	28.50	14	72	11.85
7	60	28.25	12	60	12.95
6	60	31.50	10	60	13.00
4	40	35.00	8	60	13.30
3	40	37.00			
2½	30	39.25			
2	24	60.75			

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00)	$135.00
No. 1 Ohio	120.00
Sec. Quality, Pa., Md., Ky., Mo., Ill.	120.00
No. 2 Ohio	103.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $2.00)	21.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$150.00
Childs, Hays, Pa.	155.00
Chicago District	160.00
Western Utah	175.00
California	180.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	157.00-160.00
Silica cement, net ton, bulk, Latrobe	28.50
Silica cement, net ton, bulk, Chicago	25.50
Silica cement, net ton, bulk, Ensley, Ala.	26.50
Silica cement, net ton, bulk, Mt. Union	24.50
Silica cement, net ton, bulk, Utah and Calif.	37.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.	$105.00
Standard chemically bonded, Curtiner, Calif.	115.00
Burned, Balt.	99.00

Magnesite Brick

Standard Baltimore	$131.00
Chemically bonded, Baltimore	116.00

Grain Magnesite

St. ⅜ to ½-in. grains

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Midwest	17.00
Missouri Valley	15.00

(Effective Jan. 27, 1958)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢ lb.	Merch. Wire Galv. ¢ lb.
Alabama City *R3*	173	187		212	193	8.65	9.20
Aliquippa *J3***	173	190			190	8.65	9.325
Atlanta *A8***	175	192		214	198	8.75	9.425
Bartonville *K2***	175	192	178	214	198	8.75	9.425**
Buffalo *W6*						8.65	8.95*
Chicago *N4*****	173	190	172	212	196	8.65	9.325
Cleveland *A6*							
Cleveland *A5*						8.65	
Crawf'dsv. *M4***	175	192		214	198	8.75	9.425
Donora, Pa. *A5*	173	187		212	193	8.65	9.20
Duluth *A5*	173	187		212	193	8.65	9.20
Fairfield, Ala. *T2*	173	187		212	193	8.65	9.20
Galveston *D4*	9.10‡						
Houston *S2*	178	192		217	198	8.90	9.45
Jacksonville *M4*	184 ‡	197		219	203	9.00	9.675
Johnstown *B3***	173	190	172		196**	8.65	9.325**
Joliet, Ill. *A5*	173	187		212	193	8.65	9.20
Kokomo *C9***	175	189		214	195*	8.75	9.30*
L. Angeles *B2*****						9.60	10.275
Kansas City *S2**	178	192		217	198*	8.90	9.45*
Minnequa *C6*†	178	192	177	217	198†	8.90	9.45†
Monessen *P6*					193	8.65	9.20
Palmer, Mass. *W6*						8.95	9.50*
Pittsburg, Cal. *C7*	192	210			213	9.60	10.15
Rankin, Pa. *A5*	173	187			193	8.65	9.20
So. Chicago *R3*	173	187			193	8.65	9.20
S. San Fran. *C6*†				236		9.60	10.15†
Sparrows Pt. *B3*****	175			214	198	8.75	9.425
Sterling, Ill. *N4*****	175	192	172	214	198	8.75	9.425
Struthers, O. *Y1**						8.65	9.30
Worcester *A5*	179					8.95	9.50
Williamsport *S5*							

* Zinc less than .10¢.
** 11-12¢ zinc.
*** .10¢ zinc.
† Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Baltimore, Md. *T8*	9.50	10.40	12.60	15.60	18.55
Bristol, Conn. *W12*		10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70		
Detroit *D1*	9.05	10.50	12.70	15.70	
Detroit *D2*	9.05	10.50	12.70		
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60		
Franklin Park, Ill. *T8*	9.05	10.25	12.45	15.45	18.40
Harrison, N. J. *C11*			12.90	16.10	19.30
Indianapolis *J3*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Pittsburgh *S7*	8.95	10.40	12.60	15.60	18.55
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*		10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.55
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *J3*	8.95	10.40	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	36.34	42.56	35.22
	2½	12	48.94	57.31	47.43
	3	12	56.51	66.18	54.77
	3½	11	65.97	77.25	63.93
	4	10	87.61	102.59	85.53
National Tube	2	13	36.34	42.56	35.22
	2½	12	48.94	57.31	47.43
	3	12	56.51	66.18	54.77
	3½	11	65.97	77.25	63.93
	4	10	87.61	102.59	85.53
Pittsburgh Steel	2	13	36.34	42.56	
	2½	12	48.94	57.31	
	3	12	56.51	66.18	
	3½	11	65.97	77.25	
	4	10	87.61	102.59	

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Pct. Discounts

Machine and Carriage Bolts	Full Container Price	30 Containers	20,000 Lb.	40,000 Lb.
½" and smaller x 6" and shorter	49	54	56	57
⅝" thru 1" x longer than 6"	35	40	43	45
Rolled thread carriage bolts ½" & smaller x 6" and shorter	49	54	56	57
Lag, all diam. x 6" & shorter	49	54	56	57
Lag, all diam. longer than 6 in.	39	44½	47	48½
Plow bolts, ½" and smaller x 6" and shorter	49	54	56	57

(Add 25 pct for broken case quantities)

Nuts, Hex, HP reg. & hvy.	Full case or Keg price
¾ in. or smaller	60½
⅞ in. to 1 in. inclusive	55½
1⅛ in. to 1½ in. inclusive	58½
1⅝ in. and larger	53½
C. P. Hex, reg. & hvy.	
¾ in. and smaller	60½
⅞ in. to 1½ in. inclusive	55½
1⅝ in. and larger	53½
Hot Galv. Hex Nuts (All Types)	
¾ in. and smaller	46½
Semi-finished Hex Nuts	
⅝ in. or smaller	60½
¾ in. to 1½ in. inclusive	55½
1⅝ in. and larger	53½

(Add 25 pct for broken case or keg quantities)

Finished

⅞ in. and smaller 63

Rivets

Base per 100 lb

½ in. and larger $12.25

Pct. Off List

7/16 in. and smaller 19

Cap Screws

Discount (Packages)

	Full Finished H. C. Heat Treat	
New std. hex head, packaged		
⅝" diam. and smaller x 6" and shorter	40	26
¾", ⅞", and 1" diam. x 6" and shorter	22	3
⅝" diam. and smaller x longer than 6"	8	+13
¾", ⅞", and 1" diam. x longer than 6"	+ 6	+32
	C-1018 Steel Full-Finished Cartons	Bulk
¼" through ⅝" dia. x 6" and shorter	58	49
¾" through 1" dia. x 6" and shorter	45	33

Minimum quantity—¼" through ⅜" diam., 15,000 pieces; 1/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts

Plain Finish	Quantity	Discount Mach. Screws	Stove Bolts
Cartons		19	32
Bulk			
To ¼" diam. incl.	25,000-200,000	9	54
5/16 to ½" diam. incl.	25,000-200,000	9	54
All diam. over 3" long	5,000-100,000	—	54

Machine Screws & Stove Bolt Nuts

	Quantity	Discount Hex	Square
In Cartons		16	19
In Bulk			
⅜" diam. & smaller	15,000-100,000	7	9

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.7
Chicago	140.9
San Francisco-L. A.	148.6

Dec. 1955. value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Rolled elliptical, 18 in. or longer, 5000 lb lots	42.00
Electrodeposited	33.25
Brass, 80-20, ball anodes, 2000 lb or more	44.00
Zinc, ball anodes, 2000 lb lots	16.50
(for elliptical add 1¢ per lb)	
Nickel, 99 pct plus, rolled carbon, 5000 lb	1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium	1.55
Tin, ball anodes $1.13 per lb (approx.).	

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	71.70
Copper sulphate, 100 lb bags, per cwt.	24.35
Nickel salts, single, 100 lb bags	40.50
Nickel chloride, freight allowed, 300 lb	48.50
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	24.05
(Philadelphia price 24.50)	
Zinc cyanide, 100 lb	60.75
Potassium cyanide, 100 lb drum N. Y.	48.00
Chromic acid, flake type, 10,000 lb or more	31.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots for minus 100 mesh

Swedish sponge iron, del. East of Miss. River, ocean bags, 23,000 lb. and over	10.5¢
F.O.B. Riverton or Camden, New Jersey, freight allowed west of Miss. River	9.5¢
Domestic sponge iron, 98+% Fe, 23,000 lb. and over del'd East of Miss. River	10.5¢
F.O.B. Riverton, New Jersey, West of Miss. River	9.5¢
Canadian sponge iron, del'd in East, carloads	10.5¢
Electrolytic iron, annealed, imported 99.5+% Fe	27.5¢
domestic 99.5+% Fe	36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe	57.0¢
Electrolytic iron melting stock, 99.84% pure	27.0¢
Carbonyl iron size 3 to 20 micron, 98%, 99.8+% Fe	88.0¢ to $2.85
Aluminum, freight allowed	38.00¢
Brass, 10 ton lots	31.1¢ to 47.1¢
Copper, electrolytic	41.50¢
Copper, reduced	40.3¢ to 48.8¢
Cadmium, 100-199 lb. 35¢ plus metal value	
Chromium, electrolytic, 99.85% min. Fe. 03 max. Del'd	$5.00
Lead	21.50¢ lb, f.o.b. plant
Manganese f.o.b. Extron, Pa.	46.0¢
Molybdenum, 99%	$3.60 to $3.95
Nickel, chemically precipitated	$1.05
Nickel, unannealed	$1.60
Nickel, annealed	$1.66
Nickel, spherical, unannealed #80	$1.13
Silicon	43.50¢
Solder powder	13¢ plus met. value
Stainless steel, 302	$1.02
Stainless steel, 316	$1.20
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh) $3.75 (nominal)	
Zinc, 5000 lb & over	17.5¢ to 30.7¢

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.59	9.87	10.13	8.64	8.97	9.05	9.01	10.68				
Baltimore	$.10	8.38	8.98	9.71	8.86	8.76	9.29	9.16	11.44*	16.18	15.18	19.73	18.98
Birmingham	.15	8.18	9.45	10.15	8.23	8.56	8.64	8.60	10.57				
Boston	.10	9.48	10.54	11.55	9.52	9.82	9.73	9.83	13.00	15.79	15.38	19.89	19.18
Buffalo	.15	8.40	9.15	11.22	8.65	9.05	9.05	8.95	11.05*	16.34	15.15	19.01	18.95
Chicago	.15	8.35	9.60	10.15	8.38	8.71	8.79	8.75	8.95	15.80	14.80	19.35	18.60
Cincinnati	.15	8.49	9.65	10.20	8.69	9.08	9.33	9.07	9.46	15.61	15.11	18.96	18.91
Cleveland	.15	8.33	9.60	10.10	8.48	8.94	9.16	8.84	10.95*	15.89	14.89	19.44	18.96
Denver	.20	9.70	11.30	12.49	9.80	9.70	9.80	9.98	10.65				17.60
Detroit	.15	8.58	9.85	10.50	8.73	9.06	9.33	9.05	9.30	15.46	15.06	18.81	18.86
Houston		7.45	8.75		7.60	8.05	7.60	7.55	11.10	16.20		19.30	19.05
Kansas City	.20	9.02	10.27	10.07	9.05	9.38	9.46	9.42	9.87	20.02	15.47	20.02	19.27
Los Angeles	.10	7.85**	10.85	11.75	7.90	7.90	7.95	7.90	13.35*	17.05	16.10	21.05	20.35
Memphis	.15	8.55	9.80		8.60	8.93	9.01	8.97	12.11*				
Milwaukee	.15	8.48	9.73	10.28	8.51	8.84	9.00	8.88	9.18	15.43	14.93	18.78	18.73
New York	.10	8.97	10.23	10.66	9.41	9.53	9.45	9.67	12.86*	15.02	15.19	18.42	18.99
Norfolk	.20	8.00			8.40	8.35	8.70	8.45	10.70				
Philadelphia	.10	8.10	9.00	9.97	8.79	8.87	8.60	8.75	11.61*	15.61	15.11	18.96	18.91
Pittsburgh	.15	8.33	9.60	10.50	8.48	8.71	8.79	8.75	10.95*	15.80	14.80	19.35	18.60
Portland		8.50	11.20	11.55	9.05	8.30†	8.65	8.65	14.50	18.50	16.10	20.75	20.25
San Francisco	.10	9.45	10.85	11.10	9.55	9.70	9.60	9.80	13.10	17.05	16.10	21.05	20.35
Seattle		9.95	11.15	12.00	10.00	9.70	9.80	10.80	14.05	16.55	16.35	20.65	20.15
Spokane	.15	10.10	11.30	12.15	10.15	9.85	9.95	10.25	14.20		17.35	21.55	21.05
St. Louis	.15	8.60	9.94	10.51	8.74	9.08	9.25	9.12	9.56	15.66	15.16	19.01	18.96
St. Paul	.15	8.94	10.19	10.76	8.99	9.45	9.53	9.37	9.81		15.26		19.06

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** All sizes except 18 and 16 gage.

†† 10¢ zinc. ‡ Deduct for country delivery. † 3/16 in. to ½ in. * C1018—1 in. rounds.

(Effective Jan. 27, 1958)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	
Birmingham *R3*	62.00	62.50*			
Birmingham *W9*	62.00	62.50*	66.50		
Birmingham *U4*	62.00	62.50*	66.50		
Buffalo *R3*	66.00	66.50	67.00	67.50	
Buffalo *H1*	66.00	66.50	67.00	67.50	
Buffalo *W6*	66.00	66.50	67.00	67.50	
Chester *P2*	66.50	67.00	67.50		
Chicago *I4*	66.00	66.50	66.50	67.00	
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50		
Fontana *K1*	75.00	75.50			
Geneva, Utah *C7*	66.00	66.50			
Granite City *G2*	67.90	68.40	68.90		
Hubbard *Y1*			66.50		
Ironton, Utah *C7*	66.00	66.50			
Midland *C11*	66.00				
Minnequa *C6*	68.00	68.50	69.00		
Monessen *P6*	66.00				
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*		66.50	67.00	67.50	
Sharpsville *S5*	66.00	66.50	66.50	67.00	
So. Chicago *R3*	66.00	66.50	66.50	67.00	
So. Chicago *W8*	66.00		66.50	67.00	
Swedeland *A2*	68.00	68.50	69.00	69.50	
Toledo *I4*	66.00	66.50	66.50	67.00	
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	74.00
Youngstown *Y1*			66.50	67.00	

DIFFERENTIALS: Add, 75c per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct); 50c per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31 0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4* (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $103.50; (15.51-16.00), $106.50. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add $1.25 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under .10 pct phos.): $64.00. Add $1.00 premium for all grades silvery to 18 pct.

† Intermediate low phos.

STAINLESS STEEL

Base price cents per lb f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.00	23.75	23.25	25.25	—	27.00	39.75	32.25	37.00	—	16.75	—	17.00
Slabs, billets	27.00	27.00	28.00	31.50	32.00	33.25	49.50	40.00	46.50	—	21.50	—	21.75
Billets, forging	—	36.50	37.25	38.00	41.00	40.50	62.25	47.00	55.75	32.00	28.25	28.75	28.75
Bars, struct.	42.00	43.00	44.25	45.00	48.00	47.75	73.00	55.50	64.75	37.75	33.75	34.25	34.25
Plates	44.25	45.00	46.25	47.25	50.00	50.75	76.75	59.75	69.75	40.25	35.00	36.75	36.00
Sheets	48.50	49.25	51.25	52.00	—	55.50	81.50	65.50	79.25	48.25	40.25	—	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	—	55.50	81.50	65.50	79.25	48.25	40.25	—	40.75
Wire CF; Rod HR	40.00	40.75	42.00	42.75	45.50	45.25	69.25	52.50 52.75	61.50	35.75	32.00	32.50	32.50

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; Vandergrift, Pa., *U1*; Washington, Pa., *W2*, *J2*, Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*.

Strip: Midland, Pa., *C11*; Waukegan, Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton-Massillon, O., *R3*; Harrison, N. J., *D3*; Youngstown, *J3*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (plus further conversion extras); *W1*; New Bedford, Mass. (.25e per lb higher), *R6*; Gary, *U1* (.25e per lb higher).

Bar: Baltimore, *A7*; S. Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R3*, S. Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*, *R3*; Ft. Wayne, *I4*; Detroit, *R5*; Gary, *U1*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.

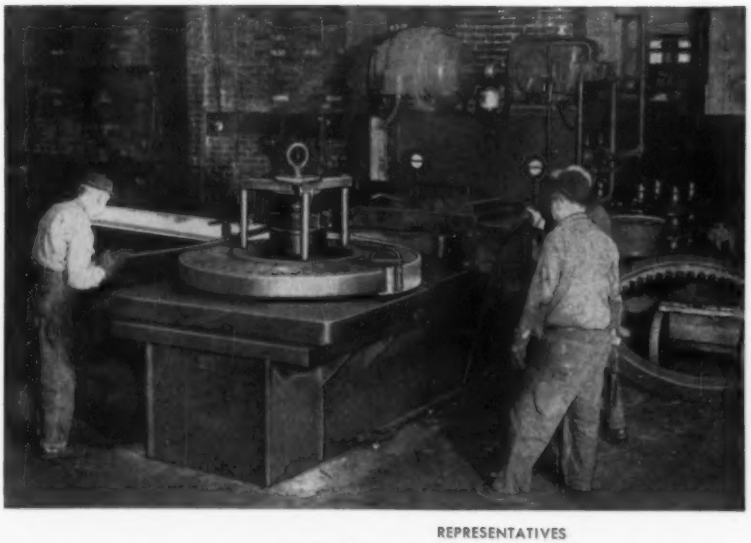
Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*; S. Chicago, *U1*.

Plates: Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown; *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Vandergrift, Pa., *U1*; Gary, *U1*.

Forging billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R5*; Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*; Munhall, Pa., S. Chicago, *U1*.

(Effective Jan. 27, 1958)

WILLIAMS-WHITE HYDRAULIC BULLDOZERS



The photograph illustrates a WILLIAMS-WHITE Hydraulic Bulldozer bending angle sections into complete circles as an initial step in the production of blade circle assemblies for use on road scrapers. The completed ring with gear inserted is shown at right in photo.

This is another example of the versatility of WILLIAMS-WHITE Hydraulic Bulldozers, available in capacities from 50 through 500 tons. For full information regarding these or other machines built to your specifications, write us or one of our representatives.

BUILDERS OF MACHINERY SINCE 1854

WILLIAMS-WHITE & Co.

302 EIGHTH ST. • MOLINE, ILLINOIS

PRESSES • BULLDOZERS • BENDERS • PUNCHES • SHEARS

REPRESENTATIVES

CALIFORNIA, Los Angeles: George A. Davies Mach'y Co.
ILLINOIS, Chicago: WILLIAMS-WHITE & CO., 53 W. Jackson Blvd.
MICHIGAN, Detroit: E. E. Wood Mach'y Co.
MISSOURI, St. Louis or Kansas City: Robt. R. Stephens Mach'y Co.
OHIO, Cincinnati: Columbus or Dayton: Seifreat-Elstad Mach'y Co.
Cleveland: A. L. Bechtel & Son
OREGON, Portland: Allied Northwest Mach. Tool Corp.
PENNSYLVANIA, Pittsburgh: Frank Ryman's Sons
Wynnewood (Phila.): Edw. A. Lynch Mach'y Co.
WASHINGTON, Seattle: Perine Mach'y & Supply Co.
WISCONSIN, Milwaukee: Pagel Mach'y Co.

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	38.00
0.05% C....	39.00	1.00% C....	37.75
0.10% C....	38.50	1.50% C....	37.50
0.20% C....	38.25	2.00% C....	37.25

4.00-4.50% C, 60-70% Cr, 1-2% Si.. 28.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 27.50
0.025% C (Simplex) 36.75
7-8½% max C, 50-55% Cr, 3-6% max Si 25.00
7-8½% max C, 50-55% Cr, 3% max Si 25.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.31
0.50% max. C	1.31
9 to 11% C, 88-91% Cr, 0.75% Fe...	1.40

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (½" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	$1.29
Ton lots	1.31
Less ton lots	1.33

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in. x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads	27.50	14.20
Ton lots	32.75	15.65
Less ton lots	34.35	17.30

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Ca, 60-65% Si, 3.00 max. Fe.

Carloads	25.65
Ton lots	27.95
Less ton lots	29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	24.25
Ton lots	26.15
Less ton lots	27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	21.15
Less ton lots	22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	17.20
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	12.25
Johnstown, Pa.	12.25
Sheridan, Pa.	12.25
Philo, Ohio	12.25
S. Duquesne	12.25

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	14.80
Ton lots packed	17.20

Spiegeleisen

Per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$100.50
19 to 21%	3% max.	102.50
21 to 23%	3% max.	105.00

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	34.00
Ton lots	36.00
250 to 1999 lb	38.00
Premium for Hydrogen - removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 25.50

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	33.60	36.40	37.60
0.30% max. C	32.10	34.90	36.10
0.50% max. C	31.60	34.40	35.60
0.75% max. C, 80 85% Mn, 5.0-7.0% Si ...	28.60	31.40	32.60

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carloads bulk	12.80
Ton lots, packed	14.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet	15.10
Ton lots, packed, pallets	16.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots, packed	Carloads, packed
96.75% Si, 1.25% Fe..	24.20	22.90
98% Si, 0.75% Fe	24.95	23.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk	7.70
Ton lots, packed	10.50

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.20	75% Si....	16.40
65% Si....	15.25	85% Si....	18.10
	90% Si....	19.50	

Ferrovanadium

50-55% V delivered, per pound, contained V, carloads, packed.

Openhearth	3.20
Crucible	3.30
High speed steel (Primos)	3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots..	2.40	3.30	4.55

(Effective Jan. 27, 1958)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.28

Ferrocolumbium, 50-50%, 2 in. x D, delivered per pound contained Cb.

Ton lots	$4.90
Less ton lots	4.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Sb plus Ta $4.25

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.68

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton $90.00
10 tons to less carload $110.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $240.00

Ferrotungsten, ¼ x down packed, per pounds contained W, ton lots delivered ..... $2.60 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. $1.41
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .. $1.38

Zirconium, per lb of alloy

35-40% f.o.b. freight allowed, carloads, packed	27.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Bortram, f.o.b. Niagara Falls.

Ton lots per pound	45¢
Less ton lots, per pound ...	50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4.5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 14.00¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots, F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B	.85
14 to 19%	1.20
19% min. B	1.50

Grninal, f.o.b. Bridgeville, Pa., freight, allowed, 100 lb and over

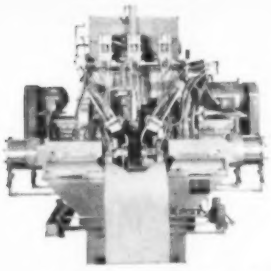
No. 1	$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	$1.46
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

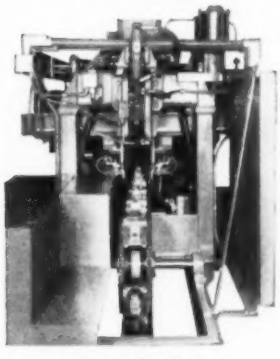
Entry end of line



Federal

PACKAGED PRODUCTION LINE

Automates Pedal Bracket Manufacture for Dodge!



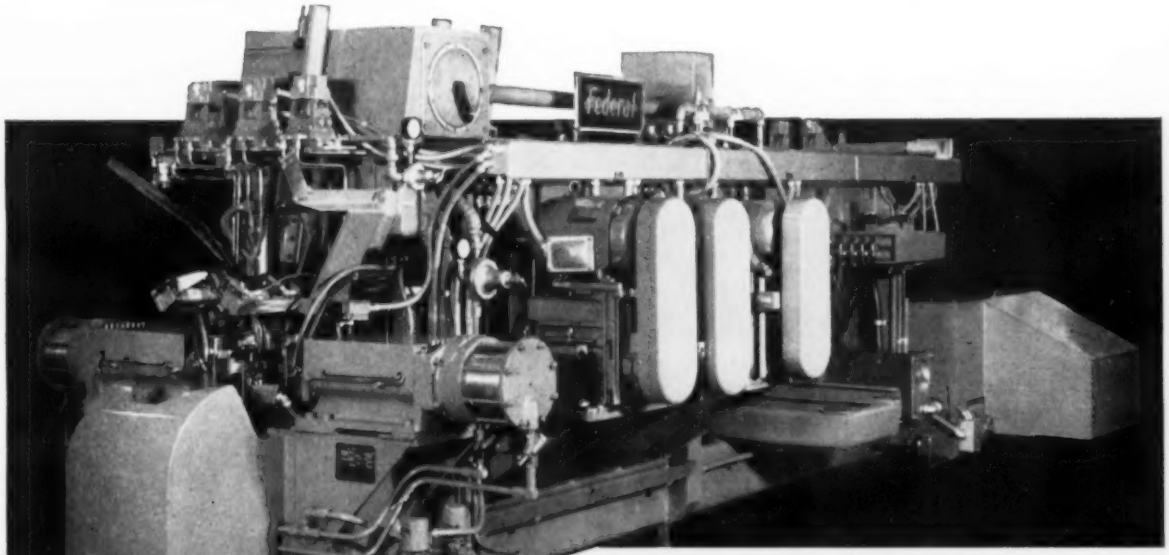
Exit end of line

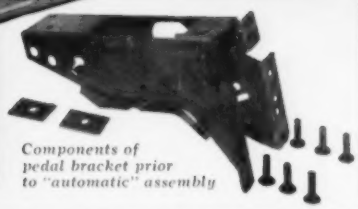
SINGLE LINE AUTOMATICALLY FEEDS, SPOT FACES, REAMS, DE-BURRS, WELDS TO SPEED PRODUCTION, CONTROL UNIFORMITY OF PEDAL PART

The Dodge Division of the Chrysler Corporation recently set into operation a single Federal machine that performs manufacturing functions normally requiring many separate pieces of equipment. In the fabrication of automotive pedal brackets this Federal "Packaged Production Line" was made to feed and weld two pads to the bracket, spot face one pad, ream and de-burr holes in each pad, feed and weld six mounting bolts and eject the finished piece at a rate of 775 units per hour.

The combining of several manufacturing operations into one has many natural advantages. It means one source responsibility, reduced floor space, and handling requirements, equipment economies and greater product uniformity.

Don't overlook these benefits—talk with Federal—a pioneer in the development and manufacture of "Packaged Production Lines."





Components of pedal bracket prior to "automatic" assembly

Finished pedal bracket

Federal WELDERS®

Warco PRESSES®

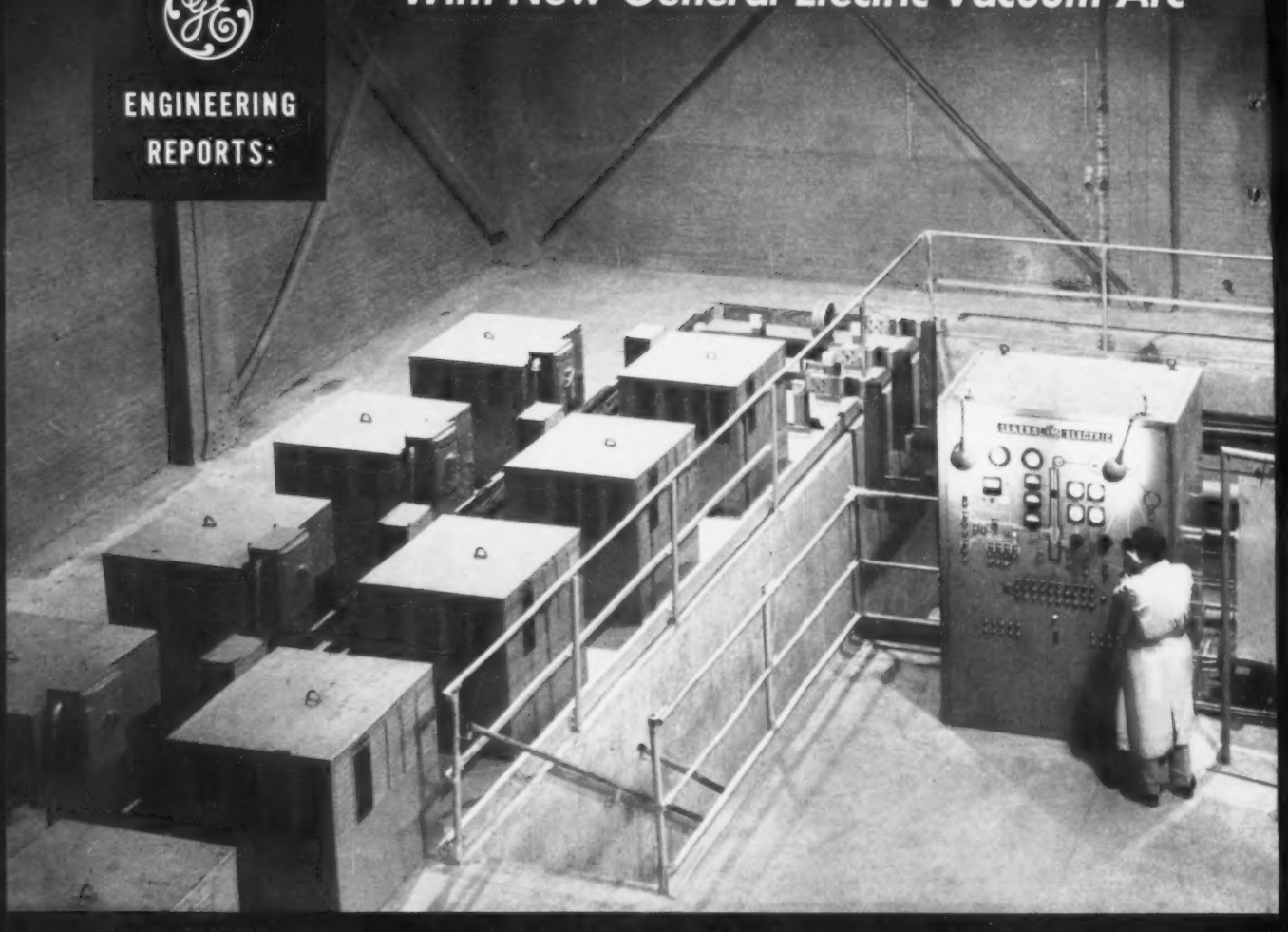
The Federal Machine and Welder Company

225

WARREN, OHIO

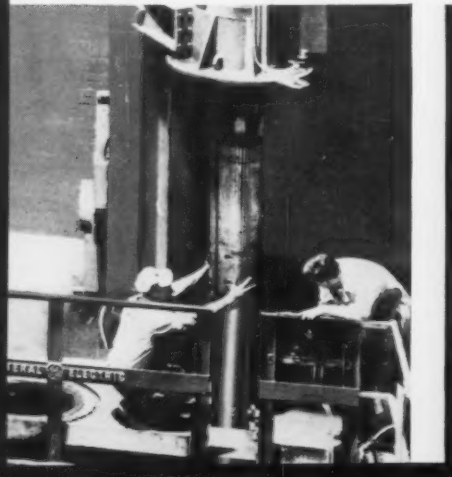
ENGINEERING REPORTS:

With New General Electric Vacuum Arc



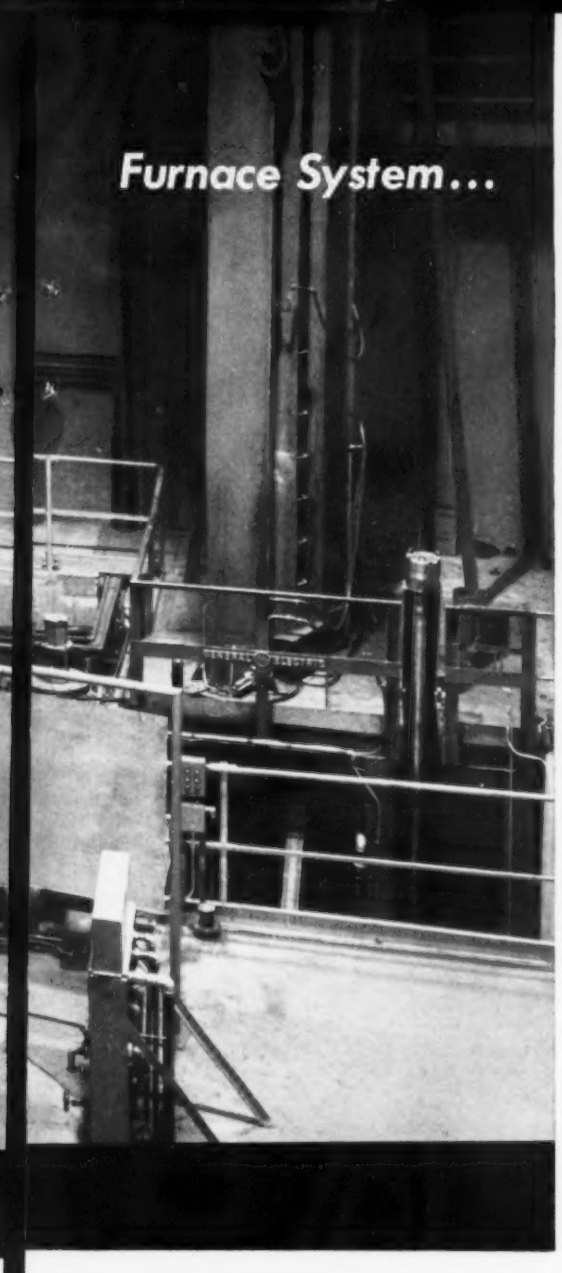
NEW APPROACH to vacuum arc furnace design is reflected in this G-E installation at Universal-Cyclops Steel. Unique current collector and electrode drive permitted a lowering in ceiling height required, helped reduce installation time and cost. G.E. offers a line of furnaces covering ingot sizes from $2\frac{1}{2}$ to 30 inches in diameter, weights up to 25,000 pounds.

CURRENT COLLECTOR, being attached to electrode, provides a sliding contact—a basic G-E design improvement in vacuum arc furnaces.



ELECTRODE DRIVE SYSTEM, using amplidyne control of proven dependability, is another G-E improvement. Here, operator lowers electrode housing with electrode into furnace body.

COMPLETED molybdenum ingot, being stripped from crucible assembly, has pure, uniform-grain structure that permits faster machining.



Universal-Cyclops Steel produces high-purity Moly ingots

New current collector assembly reduces downtime between melts, eases handling of ingots and electrodes

To help produce molybdenum ingots of high purity for demanding applications, Universal-Cyclops Steel Corp. recently installed a General Electric vacuum arc furnace system in its Bridgeville, Pa. plant. Such production-type furnaces are capable of melting ingots 16 inches in diameter by 66 inches long and weighing up to 5500 pounds. They are designed and engineered by General Electric as co-ordinated systems, complete with all other electric equipment needed from incoming power line to furnace arc.

Successful from the first melt

The furnace's self-supporting, unit-type construction minimized installation time and cost. Successful operation was obtained from the first melt. And Universal-Cyclops officials are completely satisfied with the ease and safety with which the furnace can be operated. These results stemmed from many newly developed features of the furnace itself, plus G-E engineering assistance during installation and startup.

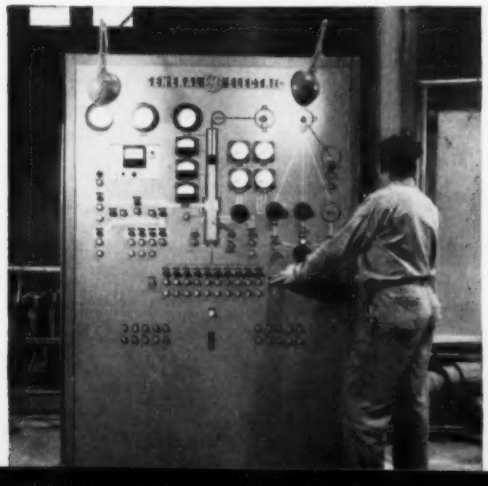
Loading operation simplified

For example, a unique current collector system, using a sliding contact, picks up the arc current from inside the electrode housing. This time-tested principle is similar to that of a d-c motor commutator. This permits raising and swinging the electrode housing to one side for loading, reducing ceiling height requirements, simplifying the loading operation and the handling of electrodes. It also permits using an accurate compact electrode drive system automatically controlled by means of the more dependable, instant-acting G-E amplidyne.

Engineering assistance available

General Electric engineering services are constantly at work in the development and design of even better electrical systems for the vacuum melting industry. For instance, General Electric has completed design of a new silicon rectifier power supply for use in vacuum arc furnace systems, and is prepared to furnish these systems to your industry. From design through application, manufacturing, installation and operation, these services are available to you. Contact your local G-E Apparatus Sales Office early in the planning stage. Meanwhile, send for Bulletins GER-1450 "How to Select a Vacuum Arc Furnace," and GED-3599 "Here's Why G.E.'s Vacuum Arc Furnace Is Your Best Buy" to General Electric Company, Section 659-119, Schenectady 5, N. Y.

SYSTEM-DESIGNED G-E panel for effective control of entire operation contains instruments and devices for regulating arc voltage and current, furnace pressure, etc.



Engineered Electrical Systems for Steel Mills

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ELECTRIC POWER EQUIPMENT
DC MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	3900	Elliott		475	320
1	2250	Elliott		600	200/300
1	2200	G.E.	MCF	600	400/500
1	1750	Elliott		250	175/350
1	1375	G.E.	MCF	415	1300
1	1200	G.E.	MCF	600	450/600
1	940	Whse.	QM	250	140/170
3	800	G.E.	MCF	250	400/750
3	450	Whse.		550	415
2	300	G.E.	MPC	230	400
2	200	Whse.	CB-307.6	250	850/1200
3	125	Whse.	SK-190	230	450/1200
1	150	G.E.	CDBB	600	250/700
1	150	Cr. Wh.	65-H	230	1150
1	125	Whse.	SK-185	230	350/1050
2	100	Whse.	SK-181	230	450/1000
1	75	G.E.	CD-1231	230	850
1	50	G.E.	MD-412-AE	230	550
6	40	Rel.BB	385FTEFC	230	500/1500
1	1500	Whse.		525	600
2	750	G.E.	MCF	600	450/900
1	750	G.E.	MCF	600	300/720
1	750	G.E.	MCF	600	120/360

MG SETS—3 Ph. 60 Cy.

Qu.	K.W.	Make	RPM	DC Volts	AC Volts
1	2000	G.E.	514	600	2300/4600
2	1750/2100	G.E.	514	250/300	2500/4600
1	1500	G.E.	600	600	4160/2300
2	1000	G.E.	720	600	6600/13200
1	750	G.E.	720	125/250	2300/4600
1	500	Whse.	900	125/250	440
1	500	G.E.	900	125/250	440/2300
1	350	G.E.	900	125	4160/2300/440
2	300	G.E.	1200	250	2300
1	250	Whse.	1200	275	2300
1	200	Whse.	1200	550	2300
1	200	G.E.	1200	250	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
3	3333	Whse.	OISC	1	13800 x 2300
1	1500	G.E. auto	HT	3	4000/4200/4400
3	1000	G.E.	WYDDJ	1	2400 x 480
3	1000	G.E.	OA/FA	1	13800 x 230/460
2	750	G.E.	Pyranol	1	4800 x 83/55
3	500	Kuhl	OISC	1	13200 x 6600
3	500	Moloney	OISC	1	6600/11430Y x 2300/4000Y
1	225	Marcus	Auto-air	3	208/220
Unused					
3	150	G.E.		1	33000x2300/4000Y
3	100	Whse.	OISC	1	4600/2300 x 460/230/115
3	100	G.E.	OISC	1	22900x2400/4160Y
Unused					

BELYEA COMPANY, INC.
47 Howell Street, Jersey City 6, N. J.

Southern Sales Aid Northern Dealers

Used machinery dealers in the Midwest are discovering a good market for tools in Texas and Florida.

They can offset freight disadvantages by offering a good selection of equipment at attractive prices.

■ The fast rate of industrial expansion in the South and Southwest is proving a welcome market for some northern used machine tool salesmen. The biggest prospects are coming from former northern customers who either go south to set up branch plants of existing concerns or establish independent shops.

"We have found a rather substantial market in good quality used machinery in both Texas and Florida," says Paul Connell, president of Connell Machinery Company, Toledo, Ohio.

Southern Shortage — "In many cases, people we know from Toledo have gone south and found a shortage of good used machinery in the area. Since little machinery previously existed it was difficult for dealers to accumulate any inventory and build up a business.

"We have enough mutual confidence from previous personal contacts so that the southern people can do business on the long-distance telephone. We then shop around and get them exactly what they want since there is no shortage of good tools in industrialized northern areas," says Mr. Connell.

General Tools for Florida—"One aspect which needs special attention, however, is that our shop reconditioning here has to be exactly right because it's difficult to adjust any mistakes when the machine is so far away."

Biggest market in Florida is in general machine shop type equipment to perform secondary operations for the new plants.

Existing plants there have not been built up because of relative low level of industry. The opportunities are ripe for high quality, all-around machine shop work.

Production Items for Texas—In Texas the demand is for heavy duty machinery such as production lathes, gear hobbers in the 72-inch class and similar equipment.

There also expansion has been at so fast a rate existing companies are installing their own machine shops. Used tool dealers in the area have sparse inventories because existing good quality items are scarce.

Texas shops on the lookout for used tools don't find the high freight from the north too much of a drawback. It's compensated for by the better selection of equipment available and the prices asked.

Ohio Market Slow—One large milling machine recently shipped from Toledo to Texas was priced at $8450. Freight amounted to about $450 so that the final price was around $8900. Locally the best buy on a comparable machine was $10,000.

In the northern Ohio used machinery market business is off even more sharply than it is nationally. Some local estimates run to 80 pct behind a year ago compared to the national average of about 37 pct.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDING ROLLS
10' x 10 Ga. Bertsch Initial Type
10' x ½" King Pyramid Type
18' x 1" Niles Pyramid Type
BORING MILL—HORIZONTAL
Cincinnati Gilbert Model J—4½" Dia. Spindle, 36" Travel, 38" x 84" Table—NEW 1956
BRAKE—PRESS TYPE
10' x ¼" & 12' x ¾" Hydraulic—NEW
BUILDING 120' x 420' New Steel Frame—Unerected
CRANES—OVERHEAD ELECTRIC TRAVELING

3 ton P&H	56' Span 220/3/60
5 ton P&H	50' Span 115 Volt D.C.
5 ton Cleveland	60' Span 110 Volt D.C.
5 ton Shepard Niles	70' Span 220 Volt D.C.
8 ton P&H	55' Span 220/3/60
10 ton Shepard Niles	38' Span 440/3/60
10 ton Shaw	48' Span 230 Volt D.C.
10 ton Shaw	120' Span 230 Volt D.C.
15 ton Shepard Niles	52' Span 230 Volt D.C.
20 ton Shaw	28' Span 230 Volt D.C.
50 ton Northern	52' Span 440/3/25 A.C.
120 ton P&H	66' Span 220/3/60 A.C.
120 ton Shepard Niles	77' Span 220/3/60

CRANE GIRDERS
10 ton Capacity 77' 2" Span—No Motors
DRAW BENCHES
8,000# Waterbury Farrel Single Draw 20 Ft. Length of Draw
10,000# Aetna Standard Single Draw 44 Ft. Length of Draw
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1" to 5" Acme Ajax National
FURNACE—MELTING
15 ton Heroult Top Charge, 12' Shell Complete with Transformers
HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING 800 lb. to 12,000 lb. incl.

HEADERS
#250C Manville Solid Die Single Stroke
2nd Waterbury Farrel DS60D Capy. ⅝" x 6"
LEVELLERS—ROLLER
32" Torrington, 19 Rolls 1 31/32" dia.
72" Budd-McKay Flex & Roller Leveller 15 Rolls 4¼" Dia.
PRESSES—HYDRAULIC
500 ton HPM Fastraverse, Bed 36" x 36"
600 ton Elmes, 36" Stroke, 18 x 45" Bet. Cols.
1500 ton Bliss 15" Stroke, Bed 49" x 48"
1500 ton Mesta Steam Hydr. Forging Press
4500 Baldwin-Lima-Hamilton Hydr. Forging Press
PRESS—KNUCKLE JOINT
600 ton Bliss No. 25, 2½" Stroke, Bed 24 x 29"
PRESSES—STRAIGHT SIDE
180 ton Hamilton #847, 12" Str. 85½" Bet. Ups.
200 ton Clearing F1200-42, Stroke 36", Bed 44"x88"
250 ton Bliss SI 7½ Str. Bldr. 32" x 20"
PUNCH & SHEAR COMBINATIONS
Cleveland Style C, Arch. Jaw, Capy. ⅝" x ⅝"
Cleveland Style EF, Arch. Jaw, Capy. 1¼" x 1"
Cleveland Style G Single End, 60" Throat
Cleveland Style W, 60" Throat, Architectural Jaw
ROLLING MILLS
6" x 27" Torrington Wire Flattening Mill Line
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ROLLS—FORMING
14 Stand Yoder, 2½" Shaft, 36" Bet. Housings
18 Stand Custom Built, 2½" Shaft, will take 36" wide
14 Stand Custom Built, 1⅝" Shaft x 14 3/16"

ROLLS—PLATE STRAIGHTENING
108" Bertsch, Seven Rolls 9" Dia.
72" Niles, 7 Rolls 9" Dia. Motor Driven
SHEAR—ALLIGATOR
No. 4 Mesta RH LK, Capacity 2" x 12"
SHEAR—GATE
12" x ¾" Niagara Model 1212, NEW 1951
SHEAR LINES
36" x .020 Ga. Hallden Shear Line
42" Bliss Up-Cut Shear, Capacity 125" Max. With Hump & Run-out Tables
SHEARS—SQUARING
10" x ¾" Cincinnati #1810
10" x ⅝" Niagara No. 910
SHEAR—ANGLE
6" x 6" x ¾" Hilles & Jones
SLITTER
36" Wean Slitting Line
STRAIGHTENERS
No. 3 Medart 3 Roll, Capacity to 4½" Tubing
Torrington 12-Roll Capy. 1¾" Hex., Sq., Etc.
No. 0A Medart 2-Roll, Capacity ⅝" to 1" Bars
No. 0 Medart 2 rolls, Capacity to 1¼" dia. Bars
SWAGING MACHINE
#6½A Fetn Capacity 3¾" Tube, 1¼" Solid, 16" Die Length Hydraulic Feed, LATE
TUBE REDUCER
Standard 1½" Tube Reducing Machine Complete with Elect. Equip.
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Pandjiris Welding Positioner 22 x 20, Hoist Stroke 20' 10", Boom Stroke 20' 6" LATE
WIRE DRAWING MACHINES
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No. 2 Vaughn 12-Die Continuous, Capy. #14 to #27

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New Stock Catalog Available
96" Model 420 Barnes deep hole drill, 2 spindle
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20" swing No. 217 Baker Brothers box column heavy duty upright drill
4' arm 9" column Cincinnati Bickford super service radial
24" Cincinnati 4 spindle upright drill, spindle motor drive
No. 15½ Foote Burt vertical hydraulic feed driver for a multiple head (2)
20" x 72" Landis type D heavy duty plain hydraulic cylindrical grinder
53" No. 24A Gardner vertical spindle horizontal disc grinder, 15 HP, multiple vee belt dr.
8" x 24" No. 35 Abrasive surface grinder
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28 Nazel forging hammer
4" bar Universal "Tri-Way" horizontal boring, milling and drilling machine
30" x 30" x 8' Cincinnati Hypro two rail, one right hand side head, dial feed planer
600 ton No. 664 Toledo tierod frame knuckle joint coining press
600 ton Elmes cast steel high speed downward acting hydraulic press
500 ton Baldwin Southwark high speed hydraulic vertical downward working press
800 ton Model 2E48-800 Hamilton straight side single crank air clutch press
750 ton No. 3 National all steel Maxipress
96" x ⅝" capacity Beatty No. 29 power squaring shear, late
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COMPLETE BAR & ROD ROLLING MILL IMMEDIATELY AVAILABLE
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1—DOUBLE HEAD GAG STRAIGHTENING PRESS. Capacity 1¾" diameter or 1½" Square Mild Steel. Motor Operated. Sutton Eng.

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1—SUTTON NO. 2 ROUND STRAIGHTENING MACHINE. 5-Roll. Capacity 1¼" to 3½" Solid Bars; 1¼" to 4½" Tubing. 20 H.P. AC Motor.

2—54" 17-ROLL MCKAY ROLLER LEVELLERS. Rolls 4½" diameter x 54" face. All Rolls driven. Universal Spindles. Capacity .125" x 48". Driven by 15 H.P. Motor for 230 volt DC current.

1—40" UNITED ROTARY FLYING SHEAR AND LEVELLER. Capacity 22 ga. and lighter. Lengths 15" to 82". 13 Levelling Rolls.

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1—144" x 316" STAMCO POWER SQUARING SHEAR. Complete with Holddown.

1—100" x 1" BERTSCH LATE SHEAR. 26" Throat. Cam Holddown.

1—60" Diameter x 11'-7" Centers AMERICAN ROLL LATHE. Including Electric Motors & Controls for 230 volt DC current.

1—2000 H.P., General Electric SLIP RING MOTOR, for 3 phase, 60 cycle, 2300 volt current @ 257 RPM. Complete with Controls.

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Phone Mlhaum 3-5300

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1—3000 H.P. Mesta GEAR REDUCTION UNIT. Ratio 6.77 to 1.

1—3000 H.P. Mesta GEAR REDUCTION UNIT. Ratio 5.22 to 1.

1—16" 3-STAND TANDEM COLD REDUCTION MILL. Rolls 10" diameter x 16" face. Each Stand driven by 100 H.P. DC Motor, Combination Pinion Stand & Drive. Including Pay-Off Reel, Re-Coiler, etc., complete.

1—24" 4-STAND TANDEM COLD REDUCTION MILL. Rolls 10" diameter x 24" face. Each Stand driven by 250 H.P. DC Motor, Combination Pinion Stand & Drive. Including Pay-Off Reel, Re-Coiler, etc., complete.

1—42" 5-STAND 4-HI TANDEM COLD REDUCTION MILL for Tin Plate. Stands driven by 500, 1000, 1000, 1000, 1250 H.P. DC Motors respectively. Mill complete with M-G Set, Coil Box and Re-Coiler. Finishing up to 1200 RPM.

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1" x 10' No. 7 HILLES & JONES Shear

(now Consolidated Machine Co., Rochester, N. Y.)

Serial number 3847, 36" gap, stroke of blade 14", air hold downs. Excellent condition. Photo on request.

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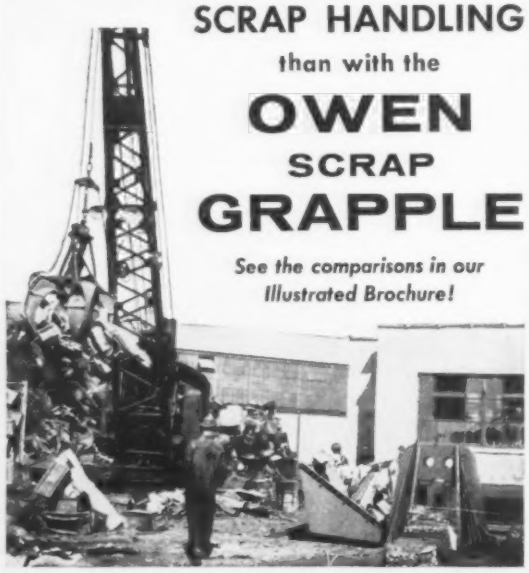

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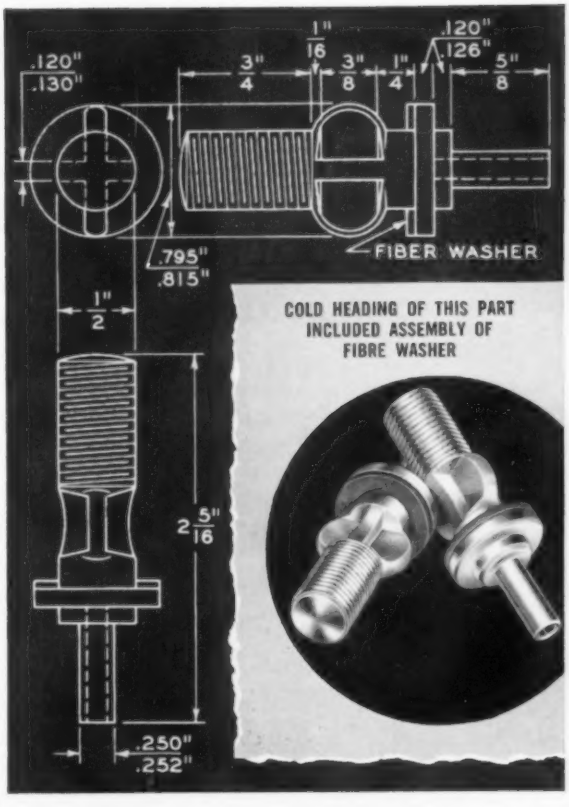

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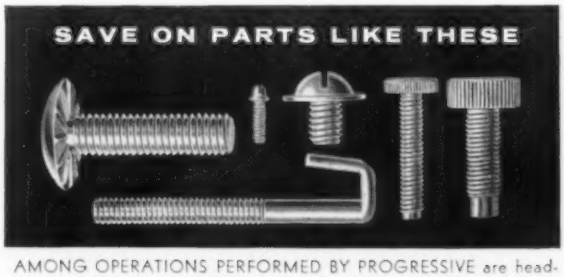
SQUARE AND HEXAGON MACHINE SCREWS AND NUTS, SEMS FASTENERS, SLOTTED TAPPING SCREWS AND PHILLIPS HEAD SCREWS

THE PROGRESSIVE MFG. CO.

Division of The Torrington Company

78 Norwood St., Torrington, Connecticut



AMONG OPERATIONS PERFORMED BY PROGRESSIVE are heading and extruding simultaneously; flattening; piercing; drilling; bending; pointing; fluted or diamond knurling; trimming; turning tenons, shoulders or recesses; struck or sawed slotting; notching.

XXV

This is the twenty-fifth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Thermal Stress-Relieving of Alloy Steels

In the production of alloy steel bars and parts made of alloy steel, stresses are sometimes set up, and these stresses must be relieved before optimum results can be expected. Two general types of stress-relieving are practiced—thermal and mechanical. In this discussion we shall consider only the former.

There are several important reasons for thermal stress-relieving. Among these are the following:

(1) The first and most fundamental purpose is to reduce residual stresses that might prove harmful in actual service. In the production of quenched and tempered alloy steel bars, machine-straightening is necessary. This induces residual stresses in varying degrees. Bars are usually stress-relieved after the straightening operation. When the bars are subjected to later processing that sets up additional stresses, subsequent stress-relieving may be necessary.

(2) A second major purpose of thermal stress-relieving is to improve the dimensional stability of parts requiring close tolerances. For example, in rough-machining, residual stresses are sometimes introduced, and these should be relieved if dimensional stability is to be assured during the finish-machining.

(3) Thermal stress-relieving is also recommended as a means of restoring mechanical properties (especially ductility) after certain types of cold-working. Moreover, it is required by the "safe-welding" grades of alloy steels after a welding operation has been completed.

Alloy bars are commonly stress-relieved in furnaces. Temperatures under the transformation range are employed, and they are usually in the area from 850 deg to 1200 deg F. The amount of time required in the furnace will vary, being influenced by grade of steel, magnitude of residual stresses caused by prior processing, and mass effect of steel being heated. After the bars have been removed from the furnace, they are allowed to cool in still air to room temperature.

In the case of quenched and tempered alloy bars, the stress-relieving temperature should be about 100 deg F less than the tempering temperature. Should the stress-relieving temperature exceed the tempering temperature, the mechanical properties will be altered.

Items other than bars (parts, for example) can be wholly or selectively stress-relieved. If the furnace method is used, the entire piece is of course subjected to the heat; selective relieving is impossible. However, if a liquid salt bath or induction heating is used, the piece can be given overall relief or selective relief, whichever is desired.

Detailed information about stress-relieving is available at all times through Bethlehem's technical staff. Feel free to consult with our metallurgists, who will cooperate fully without cost or obligation on your part. And remember that Bethlehem can furnish the entire range of AISI standard alloy steels, as well as special-analysis steels and all carbon grades.

If you would like reprints of this series of advertisements from No. 1 through No. XX, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The first 20 subjects in the series are now available in a handy 36-page booklet, and we shall be glad to send you a free copy.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

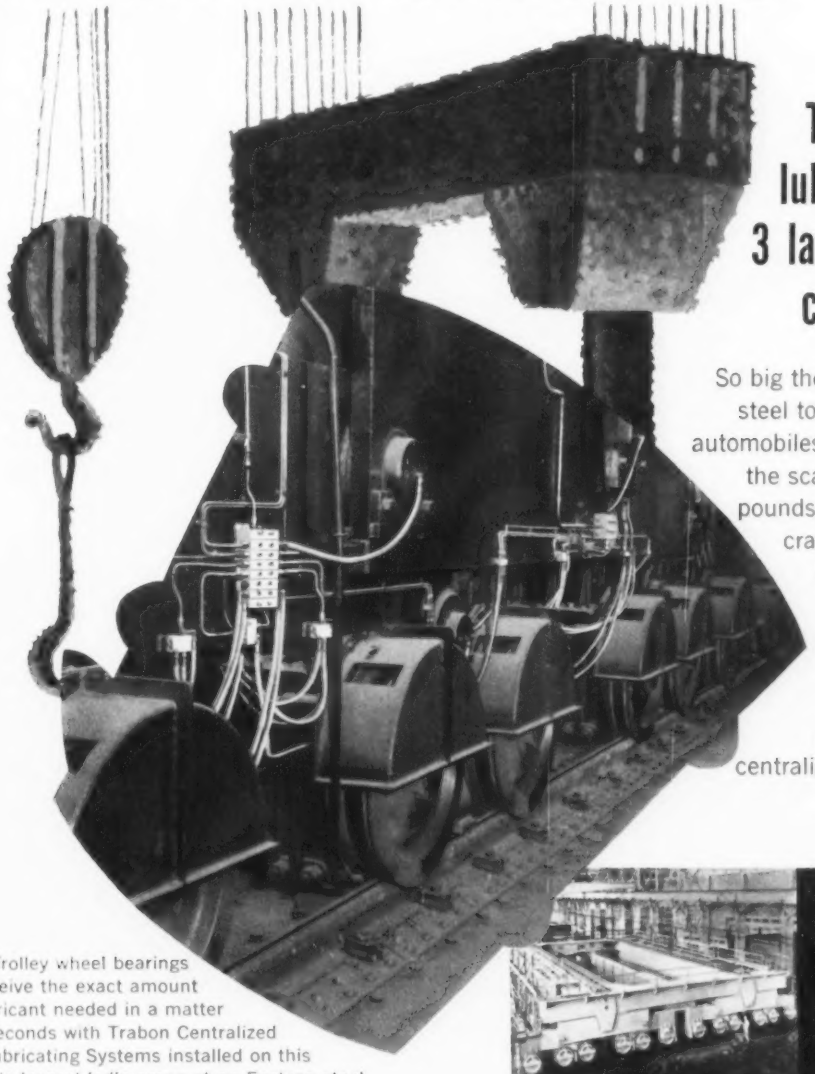
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

TRABON

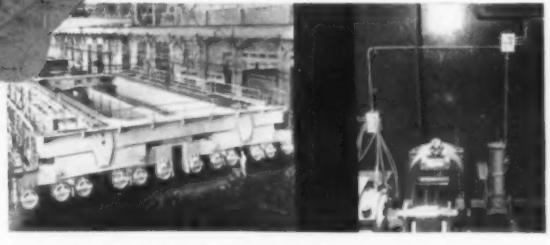
CENTRALIZED LUBRICATING SYSTEMS



Trolley wheel bearings receive the exact amount of lubricant needed in a matter of seconds with Trabon Centralized Lubricating Systems installed on this world's largest ladle crane at an Eastern steel plant. Close up shows Trabon feeder valves which operate on the positive progression principle — most practical and foolproof method yet devised for lubricating rugged industrial equipment.

Trabon lubricates world's 3 largest ladle cranes

So big they carry enough molten steel to make 750 complete automobiles. So huge they tip the scales at nearly 6 million pounds. Yes, 3 Morgan 500-ton cranes are now doing a gargantuan job at a famous Eastern steel plant. And all three cranes and their 1476 vital bearings are protected by Trabon centralized lubricating systems.



One of the three giant Morgan ladle cranes prior to being outfitted with Trabon Centralized Lubricating Systems. Note immensity of the lubricating job if it had to be done manually.

Trabon automatic lubricant pump, two feeders and lubricant lines. Note cam in right foreground which automatically starts the lubricating cycle while crane is in operation. No auxiliary machinery is necessary. Trabon is easily and economically installed on hydraulic, mechanical, electric motorized and pneumatic equipment.

Trabon

Trabon Engineering Corporation

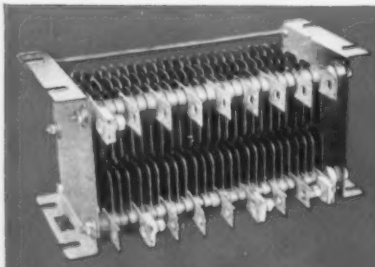
28815 Aurora Road • Solon, Ohio

Centralized OIL AND GREASE SYSTEMS *Multiflo* CIRCULATING OIL SYSTEMS

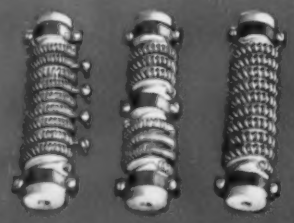
When you need HEAVY DUTY RESISTORS

insist on the finest...

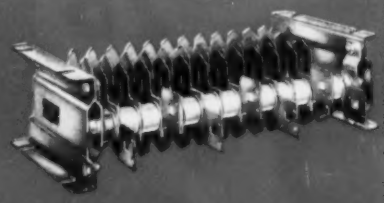
insist on Cutler-Hammer



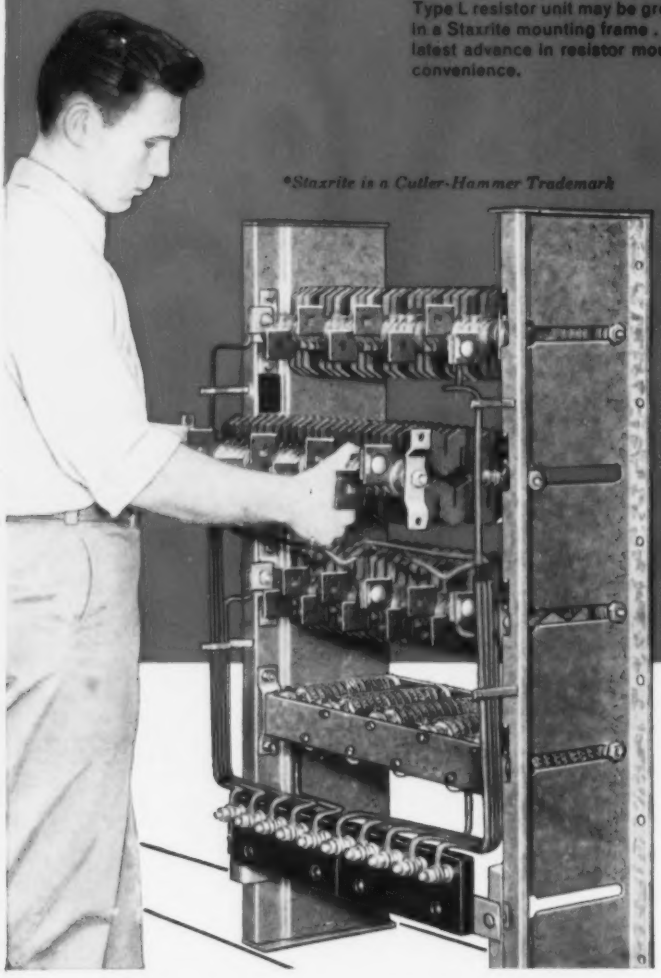
CAST GRID RESISTORS
Cutler-Hammer Bulletin 11010 Cast Grid Resistors are built to take it. Their extra rugged construction makes them ideal for those tough applications where severe overloads are to be expected. The individual cast grids are supported at three points within the sturdy steel frame and thoroughly insulated with mica tubes and washers. All grid terminals are easily accessible.



UNIT TYPE RESISTORS
These Bulletin 11003 Type L Resistors are available in a wide range of resistance values and capacities for either A-c or D-c service . . . perfect for scores of applications requiring a light weight, compact resistor element. Cutler-Hammer Type L resistors may be mounted separately or grouped in any of four standard size resistor frames. Note, multiple Type L resistor unit may be grouped in a Staxrite mounting frame . . . the latest advance in resistor mounting convenience.



NON-BREAKABLE RESISTORS
Cutler-Hammer's Bulletin 11011 Non-breakable Resistor with exclusive "draw-out" design is the choice among exporienced engineers everywhere. Grids are stamped from a chromium steel alloy and then welded together forming a continuous current path with a stabilized resistance value. These resistors are shock-proof, vibration-proof, and corrosion-resistant. Their high thermal capacity makes them ideal for heavy duty applications. And the "draw-out" design is extra value at no extra cost. All units slide in and out easily and quickly without disturbing the end frames, adjacent resistor units, or mounting members. "Draw-out" design will save you time and expense during installation, maintenance, and alterations.



*Staxrite is a Cutler-Hammer Trademark

Staxrite*—Here is the most modern and efficient means of mounting multiple resistor units . . . a Cutler-Hammer "first", a Cutler-Hammer exclusive. These units are free-standing and only require the floor area of a single resistor box, but they can accommodate up to nine resistor frames in a single unit. The Staxrite mounting frame packs more resistor material in a given space than ever before, and yet every resistor unit is easily reached and serviced because of the "draw-out" design. Complete terminal board wired assemblies practically eliminate costly on-the-job wiring. Unwired assemblies also available. The Staxrite mounting frame will handle the Type L resistor frame, the non-breakable resistor frame or a combination of both. Save time, save space, save money with Staxrite.

CUTLER-HAMMER
MOTOR CONTROL
C-H

Write today for further data on heavy duty resistors and the Staxrite mounting frame. CUTLER-HAMMER Inc., 1325 St. Paul Avenue, Milwaukee 1, Wis. *Associate:* Canadian Cutler-Hammer Ltd., Toronto.